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JENMAN, G. S.  
 FERNS AND FERN ALLIES...

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THE  
MAY 1864

Received of the Treasurer of the  
Board of Directors of the  
City of New York  
the sum of \$1000.00  
for the purchase of  
land for the  
City of New York  
in the year 1864

No.	Name	Amount
1	City of New York	1000.00
2	City of New York	1000.00
3	City of New York	1000.00
4	City of New York	1000.00
5	City of New York	1000.00
6	City of New York	1000.00
7	City of New York	1000.00
8	City of New York	1000.00
9	City of New York	1000.00
10	City of New York	1000.00



P R E F A C E .

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THE author of this work, the late G. S. Jenman, Esq., F.L.S., served first in the Botanical Service of Jamaica, and later as head of that in British Guiana. He was an earnest Fern student, an enthusiastic and successful collector, a great lover of Ferns, and one whose power of detecting generic and varietal differences was of no mean order. His descriptions are couched in language peculiarly his own, but are particularly accurate and true to nature.

Mr. Jenman died in February, 1902, but for many years before his death he had employed the greater part of his leisure hours on the "Ferns and Fern allies," and, with the exception of a few pages, his MSS. was complete, and only needed his final revision.

It is the first work attempting a description of all known West Indian Ferns and those of British Guiana, including the Fern allies. It has been published in parts as *addenda* to the Bulletin of the Botanical Department of Trinidad and issued at irregular intervals as time permitted its preparation. By permission of the Government it has been completed since my retirement from the Public Service in July, 1908. I am fully cognizant of the many defects which appear in the editorial work, but trust that it will nevertheless be found a useful and valuable contribution to Botanical knowledge of the Fern Flora. It is also hoped that it may form a fair foundation on which others may carry on further study.

It deals with the Ferns of Trinidad and Tobago as well as with other Islands, and forms an excellent record of the species known up to date. It is a great sorrow to me that my old friend and fellow officer is not here to see it through the press to completion.

J. H. HART, F.L.S.

December, 1909.



THE FERNS AND FERN ALLIES

OF THE

BRITISH WEST INDIES AND GUIANA.

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BY

G. S. JENMAN, F.L.S.,

*Late Government Botanist and Superintendent of the  
Botanic Gardens, British Guiana.*

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Edited by

J. H. HART, F.L.S.

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## INDEX.—CONTINUED.

	Page.		Page.		Page.
<b>POLYPODIUM.</b>		<b>POLYPODIUM.</b>		<b>SCHIZEA.</b>	
dissimile ...	274	ensifolia ...	300	dichotoma ...	358
microchasmum ...	275	megallophyllum ...	300	elegans ...	359
plebeium ...	275	Schomburghiana ...	300	flabellatum ...	359
melanotrichum ...	276			pennula ...	359
xiphopteroidæfolium ...	276				
lastefolium ...	277	<b>ADDENDA.</b>		<b>TENITIS.</b>	
lechnoides ...	277	rigens ...	301	Swartzii ...	324
arkerii ...	277	aromaticum ...	301	angustifolia ...	324
initensis ...	278	Harrissii ...	301	lanceolata ...	325
ovo-punctatum ...	278			furcata ...	325
luccanum ...	278	<b>PTERIS.</b>			
fulgens ...	279	Harrisoniæ ...	116	<b>TRICHOMANES.</b>	
bescens ...	279	palmata ...	116	setiferum ...	17
cilentum ...	279	pedata ...	116	exiguum ...	17
aimense ...	280	lomariacea ...	117	pinnatinerva ...	17
meraranum ...	280	longifolia ...	117	solitarum ...	18
pinnatifidum ...	281	grandifolia ...	118	labiatum ...	18
enoides ...	281	cretica ...	118	fruticulosum ...	18
ercivallii ...	282	serrulata ...	119	punctatum ...	19
thompsonii ...	282	denticulata ...	119	apodum ...	19
ceusatum ...	283	papyracea ...	119	sphenoides ...	19
caudatum ...	283	mutilata ...	120	limeolatum ...	19
punctatum ...	284	concinna ...	120	pusillum ...	20
rugulosum ...	284	litobrochiooides ...	120	Fraserii ...	20
nigrescentium ...	284	pungens ...	121	reptans ...	20
obliteratum ...	285	Swartziana ...	121	quercifolium ...	21
crenatum ...	285	longipinnata ...	121	Krausii ...	21
androgynum ...	286	quadriaurita ...	122	membra-naceum ...	21
tetragonum ...	286	felosma ...	122	muscoides ...	21
Flumierii ...	287	asperula ...	122	Ankersii ...	22
incarum ...	287	nemorialis ...	122	brachypus ...	22
thysanolepis ...	287	affluentus ...	122	acostea ...	22
squamatum ...	288	biaurita ...	122	pinnatum ...	22
lepidopteris ...	289	laciniata ...	123	botryoides ...	23
loriceum ...	289	inæqualis ...	124	spicatum ...	23
chnodes ...	289	podophylla ...	124	elegans ...	24
attenuatum ...	289	Kunzeana ...	125	heterophyllum ...	24
nerifolium ...	290	brevierervis ...	125	sinuosum ...	24
meniscifolium ...	290	bulbifera ...	126	incisum ...	25
adnatum ...	290	propinqua ...	126	pinnatifidum ...	25
fraxinifolium ...	291	regia ...	127	fastigiatum ...	25
surrucuchense ...	291	aculeata ...	127	crispum ...	25
remotum ...	292	bondurensis ...	128	pellucens ...	26
aureum ...	292	elata ...	128	procerum ...	26
decumanum ...	293	longibrachiata ...	128	roraimeuse ...	26
petraefolium ...	293	multiserialis ...	129	lucens ...	26
crassifolium ...	294	gigantea ...	129	splendidum ...	26
phyllitidis ...	294	crassipes ...	129	crinitum ...	27
costate ...	295	Hartiana ...	130	Kaulfussii ...	27
levigatum ...	295	heterophylla ...	130	lucens ...	27
repens ...	295	leptophylla ...	131	alatum ...	27
angustifolium ...	296	ciliaris ...	131	attenuatum ...	27
faciale ...	296	incisa ...	131	radiculatum ...	28
teniorum ...	296	vespertilionis ...	132	ptilodes ...	28
glaucophyllum ...	296	glauca ...	132	Bancroftii ...	28
pilloselloides ...	296	deflexa ...	132	macilentum ...	28
vaccinifolium ...	297	aquilina ...	132	superbum ...	28
lycopodioides ...	297	esculenta ...	133	bicorne ...	29
salicifolium ...	297	caudata ...	133	pyridiferum ...	29
chinabowensis ...	298	viscosa ...	133	brasiliensis ...	29
Swartzii ...	298			tenerum ...	29
persicariæfolium ...	298	<b>SCHIZEA.</b>		angustatum ...	30
Thurnii ...	299	incurvata ...	358	cellulosum ...	30
percussum ...	299	fluminiensis ...	358	geminatum ...	30
lanceolatum ...	299				
lepidotum ...	300				

## INDEX.—CONTINUED.

	Page.		Page.		Page.
<b>TRICHOMANES.</b>		<b>ISOETES.</b>		<b>SELAGINELLA.</b>	
trichoideum	... 30	cubana	... 405	rhodostachya	... 392
cappillaceum	... 30			Jenmani	... 393
scandens	... 31	<b>LYCOPODIUM.</b>		albo-nitens	... 393
macroclados	... 31	carolinianum	... 379	radiata	... 394
Lindenii	... 31	scariosum	... 380	roraimense	... 394
radicans	... 31	complanatum	... 380	portoricensis	... 394
speciosum	... 31	clavatum	... 381	serpens	... 395
Luschnathianum.	... 31	alopecuroides	... 381	didymostachya	... 395
Kunzeanum	... 31	cernuum	... 381	sub-stipitata	... 395
antillarum	... 31	aqualupianum	... 382	potaroensis	... 396
umbrosum	... 31	subulatum	... 382	producta	... 396
rigidum	... 32	robustum	... 382	marginata	... 396
Prieurii	... 32	verticillatum	... 382	caudorhiza	... 397
anceps	... 32	funiforme	... 383	guyanensis	... 397
		reflexum	... 383	macroclada	... 397
<b>VITTARIA.</b>		intermedium	... 383	minioides	... 398
intramarginalis	... 322	rigidum	... 383	Breyonii	... 398
lineata	... 322	dichotomum	... 384	affinis	... 399
stipitata	... 322	linifolium	... 384	epirhizos	... 399
remota	... 322	mollicomum	... 384	patula	... 400
		taxifolium	... 384	setigera	... 400
<b>WOODWARDIA.</b>		<b>SELAGINELLA.</b>		flagellata	... 400
virginica	... 145	Crugeri	... 388	stolonifera	... 401
		platyphylla	... 388	vernica	... 401
<b>FERN ALLIES.</b>		anomala	... 389	erythropus	... 401
<b>AZOLLA.</b>		minima	... 389	cuspidata	... 402
caroliniana	... 407	cayennense	... 390	flabellata	... 402
		brachyodon	... 390	Parkerii	... 402
<b>EQUISETUM.</b>		valdepilosa	... 390	Hankeana	... 403
bogotense	... 377	caribense	... 390	puberula	... 404
giganteum	... 377	poroloides	... 391	humile	... 404
		denudata	... 391	mazarunense	... 404
		confusa	... 391		
		rotundifolia	... 392	<b>SALVINIA.</b>	
		dendricola	... 392	auriculata	... 407
				radula	... 407



## CONSPECTUS.

### SERIES I.

*Spores of one kind (microspores.)*

ORDER	I.—FILICES.	—Numerous genera.
„	II.—MARATTIACEÆ.	—Marattia. Danæa.
„	III.—OPHIOGLOSSACEÆ.	—Ophioglossum. Botrychium.
„	IV.—EQUISETACEÆ.	—Equisetum.
„	V.—LYCOPODIACEÆ.	—Lycopodium. Psilotum.

### SERIES II.

*Spores of two kinds—macrospores and microspores.*

ORDER	VI.—SELAGINELLACEÆ.	—Selaginella. Isoetes.
„	VII.—MARSILEACEÆ.	—Marsilea.
„	VIII.—SALVINIACEÆ.	—Salvinea. Azolla.

### ORDER I.—Filices.

FRONDS circinnate in veneration, rarely straight; sporangia of one kind with or without a jointed ring, variously grouped on the back or edges of normal or contracted leaves.

#### SUB-ORDER I.—Polypodiaceæ.

Veneration circinnate; sporangia free, with a complete, incomplete or rudimentary medial, oblique or coronal jointed ring.

SERIES I. *Involucrateæ*.—Sori subtended by involucre (except *Alsophila* and *Notholæna*).

\* *Sporangia orbicular or obovate-cuneate, sessile or pedicilate, ring meridional, incomplete, vertical or obliquely vertical.*

**T.** *Sporangia orbicular, sessile, ring obliquely vertical.*

TRIBE I. *Hymenophylleæ*. (Filmy-ferns).—Sori globose or columnar, on subulate, protruded, marginal receptacles; enclosed in valvate or urceolate involucre.

1. *Hymenophyllum*.—Involucre bivalved.
2. *Trichomanes*.—Involucre urceolate.

**TT**.—*Sporangia obovate-cuneate or orbicular, ring vertical or sub-vertical*.

TRIBE II. *Cyatheæ* (Tree-ferns).—Sori dorsal on elevated (rarely superficial) receptacles; involucre inferior, (absent in *Alsophila*).

3. *Alsophila*.—Involucre absent.
4. *Hemitelia*.—Involucre lateral, sepal-like.
5. *Cyathea*.—Involucre cup-shaped or hemispherical.

**TTT**.—*Sporangia orbicular, pedicilate, ring vertical*.

TRIBE III. *Woodsieæ*.—Sori dorsal, punctiform or oblong; involucre inferior.

6. *Hypoderris*.—Only genus; see characters of tribe.

TRIBE IV. *Davalliæ*.—Sori marginal, sub-marginal or medial, punctiform or transversely oblong; involucre interior, the margin of the frond often forming an exterior valve.

7. *Dicksonia*.—Sori terminal on the veins, involucre cup-shaped or bilabiate.
8. *Davallia*.—Sori terminal on the veins, involucre scale-like or pocket-shaped.
9. *Cystopteris*.—Sori dorsal on the veins; involucre scale-like or hood-shaped.

TRIBE V. *Lindsayæ*.—Sori marginal or sub-marginal; linear or oblong, involucre interiorly attached, the same shape as the sori, the margin of the frond forming an exterior valve.

- 10.—*Lindsaya*.—Only genus, see characters of tribe.

TRIBE VI. *Adiantæ*.—Sori marginal, linear, oblong, reniform or roundish; inserted on the inner side of the inflexed cartilaginous margin.

- 11.—*Adiantum*.—Only genus, see characters of tribe.

TRIBE VII. *Pterideæ*.—Sori marginal, linear or in short oblong or punctiform patches; involucre exterior, the shape of the sori.

12. *Hypolepis*.—Sori punctiform in the sinuses of the ultimate lobes or teeth, covered by a crenature of the margin.
13. *Notholæna*.—Sori at length confluent around the ultimate segments or teeth, supported but not covered by the margin.
14. *Cheilanthes*.—Sori punctiform or confluent, each form covered by involucre the same shape.
15. *Pellea*.—Sori confluent, linear and uninterrupted, surrounding the margin; involucre the same shape.



16. *Plagiogyria*.—Sori confluent, linear and uninterrupted on linear segment; involucre the same shape.
17. *Lonchitis*.—Sori short, curved, in the sinuses of the final lobes, involucre the same shape.
18. *Onychium*.—Sori subopposite and confluent; the opposite involucre connivent.
19. *Pteris*.—Sori linear, on linear receptacles; involucre the same shape.

TRIBE VIII. *Lomariææ*.—Sori dorsal, transverse, linear subcostal; involucre exterior, the shape of the sori.

20. *Lomaria*.—Sori marginal.
21. *Blechnum*.—Sori subcostal, linear and uninterrupted.
22. *Woodwardia*.—Sori subcostal, interrupted and oblong.

TRIBE IX. *Aspleneææ*.—Sori linear or oblong, dorsal along the veins, single or double; involucre the same shape.

23. *Asplenium*.—Only genus, see characters of tribe.

TRIBE X. *Aspideææ*.—Sori dorsal or terminal on the veins, punctiform, reniform or orbicular; involucre peltate or reniform.

24. *Didymochlæna*.—Sori elliptical oblong; involucre attached down the centre.
25. *Aspidium*.—Sori round; involucre peltate.
26. *Nephrodium*.—Sori and involucre orbicular-reniform, dorsal.
27. *Nephrolepis*.—Sori and involucre reniform, terminal, oblique with the veins.
28. *Oleandra*.—Sori and involucre orbicular-reniform, dorsal, stipitis jointed.
29. *Fadyenia*.—Sori and involucre horse-shoe-shaped.

SERIES II. *Exinvolucrataææ*.—(Sori devoid of involucre).

TRIBE XI. *Polypodieææ*.—Sori usually round or oval, generally punctiform but sometimes larger, dorsal or terminal on the veins.

30. *Polypodium*.—Only genus; see characters of tribe.

TRIBE XII. *Grammatideææ*.—Sori arcuate, oblong or linear, often confluent or reticulated, dorsal on direct or variously united veins.

31. *Meniscium*.—Sori arcuate.
32. *Gymnogramme*.—Sori oval, oblong or linear, superficial.
33. *Enterosora*.—Sori linear-oblong, immersed in the interior of the frond.
34. *Hemionitis*.—Sori reticulated, superficial.
35. *Anetium*.—Sori thinly scattered.
36. *Antrophyum*.—Sori in zig-zag, reticulated, or straight lines, superficial or immersed.

TRIBE XIII. *Vittariæææ*.—Sori linear, costal intra or submarginal; immersed in a groove or superficial.

37. *Monogramma*.—Sori immersed or superficial along the back of the costa.  
 38. *Vittaria*.—Sori sub-marginal, immersed or sub-superficial, veins simple.  
 39. *Tænites*.—Sori sub-or intramarginal, superficial, veins reticulated.

TRIBE XIV. *Acrosticheæ*.—Sori, amorphous; fronds dimorphous; the fertile smaller or much contracted.

40. *Acrostichum*.—Only genus, see character of tribe.

\*\**Sporangia globose, sessile or pedicilate, ring complete or rudimentary.*

**T.** *Ring complete, horizontal.*

TRIBE XV. *Gleicheniæ*.—Sori dorsal, medial, punctiform or globose.

41. *Gleichenia*.—Only genus; see characters of tribe.

**TT.** *Ring rudimentary, surface reticulated.*

TRIBE XVI. *Ceratopteridæ*.—Sori dorsal, scattered on the veins.

42. *Ceratopteris*.—Only genus, see characters of tribe.

TRIBE XVII. *Osmundæ*.—Sori in contracted paniculate fronds or portions of otherwise barren fronds.

43. *Osmunda*.—Only genus; see characters of tribe.

\*\*\**Sporangia subelliptical; ring apical, crown-like, complete.*

TRIBE XVIII. *Schizææ*.—Sori in contracted panicles on the margins of the fronds or in special branches or fronds.

44. *Schizæa*.—Sori in digitate or pinnate appendages of the leaf-blade or contracted frond.  
 45. *Anemia*.—Sori in special contracted panicles, barren and fertile divisions separate.  
 46. *Lygodium*.—Sori in the imbricating scales of marginal spikes.

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## ORDER II.—*Marattiaceæ*.

Vernation circinnate; sporangia ringless, homogeneous forming muticelled cases.

1. *Marattia*.—Synangia small, elliptical or roundish, bivalved and boat-shaped when open.
2. *Danæa*.—Synangia linear or oblong covering all the under surface.

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## ORDER III.—*Ophioglossaceæ*.

Vernation straight; sporangia ringless, united and biserial in terminal or lateral spikes.

1. *Ophioglossum*.—Capsules united in linear spikes.
2. *Botrychium*.—Capsules free in panicles.

**ORDER IV.—Equisetaceæ.**

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Sporangia of one kind, opening longitudinally on the inner side, borne on the underside of peltate scales which are arranged in horizontal tiers forming a terminal cone to the branches. Spores furnished with spiral threads.

1. Equisetum. (See characters of the Order).
- 

**ORDER V.—Lycopodiaceæ.**

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Sporangia of one kind, bi-or tri-valved, single, sessile in the axils of the leaves of normal or modified branches or in spikes.

1. Lycopodium.—Sporangia bi-valved.
  2. Psilotum.—Sporangia tri-valved.
- 

**ORDER VI.—Selaginellaceæ.**

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Sporangia of two kinds, the larger containing macrospores, and the smaller microspores. borne in the axils of normal or modified leaves, in which they are free or partially embedded.

1. Selaginella.—Capsules free, bi-valved in terminal spikes.
  2. Isoetes.—Capsules embedded in the sheathing base of the leaves.
- 

**ORDER VII.—Marsileaceæ.**

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Sporangia of two kinds contained in coriaceous capsules arranged serially on the rootstock or base of the petioles.

1. Marsilea. (See characters of Order).
- 

**ORDER VIII.—Salviniaceæ.**

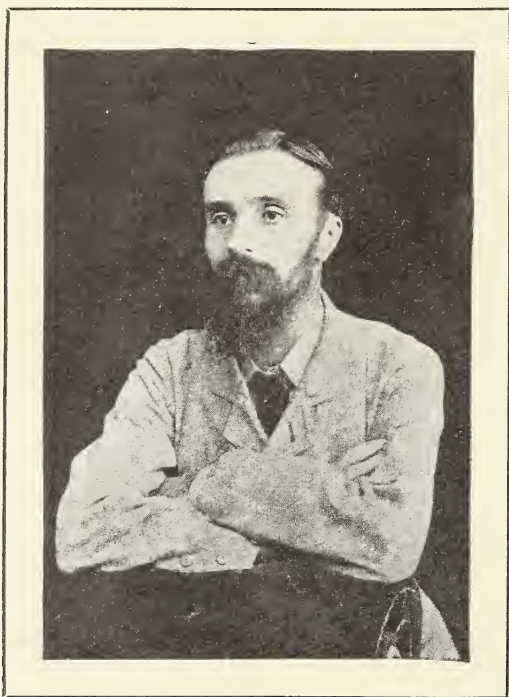
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Sporangia of two kinds, independent panicles or in the axils of minute leaves of diminutive floating communal plants.

1. Salvinia.—Sporangia borne pendent clusters beneath the plant.
  2. Azolla.—Sporangia borne in the axils of the minute leaves.
-







**J. S. JENMAN, Esq., F.L.S.,**

*Government Botanist and Superintendent Botanic Gardens,  
Georgetown, British Guiana.*

## NOTICE.

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THE present number is devoted to descriptions of the Ferns of the British West Indies and Guiana,—by G. S. Jenman, Esq., F.L.S., Government Botanist of the Colony of British Guiana—whose knowledge of West Indian Ferns is of the highest order, and whose collection of species belonging to this region probably excels that of any single collector—living or dead. Mr. Jenman has for many years past been engaged on the Fern Flora, and we are now privileged to place before the public the results of these labours of which the present is the first instalment. A *conspectus* is ready in manuscript, but it has been thought more convenient that the descriptions should take precedence of it.

The paging of the Fern issues of the Bulletin will be continuous so that when the printing has been completed the work will form a single volume.

J. H. HART.

TRIBE I.—Hymenophylleæ.

SORI MARGINAL, sub-globose or oblong; sporangia globose-orbicular, attached at or near the base, sessile, girt almost or quite round with a vertical or obliquely-vertical jointed elastic ring, which at length, with the capsule, bursts crosswise; receptacles subulate or filiform; sporangia imbricated; involucre arising from the base and enclosing the sori, valvate, tubular or urn-shaped, persistent; fronds of a thinly membranous pellucid texture, with or without a coating of usually hair-like scales, generally of small or medium size, entire or variously cut, covering thus the widest extremes.

Filmy-ferns form a distinct and well-marked tribe so peculiar in appearance as not to be confounded with any other. All the members delight in moisture, and inhabit only humid forests and well-sheltered caves and ravines. They are chiefly epiphytal, making their homes on rocks, decaying logs, and the trunks and branches of trees; a few species only are terrestrial and grow from the ground or in vegetable *débris* thereon. The majority have slender thread-like root-stocks, that creep about freely, crossing and interlacing, throwing up abundance of fronds which form masses of exquisite drapery to the surfaces which they cover.

*Involucres bilabiate*—Hymenophyllum.

*Involucres* entire, tubular or urn-shaped—Trichomanes.

GENUS I.—Hymenophyllum, Linn.

SORI TERMINAL on the inserted veins, subglobose; receptacles pad-like, subulate, or filiform, usually enclosed by the involucre, but in some cases shortly projected; involucre inferior, rarely urceolate, in most instances valvate, globose, orbicular or ovate, the lips entire and rounded or acute, or dentate; fronds little or much divided, mostly multifid.

The distinguishing character of this genus is the valvate involucre, though the character is not strictly general, and varies a good deal, sometimes even in the varieties of the same species. All the species (if we except one or two, in which it is unknown) have slender thread-like rootstocks, which freely spread and interlace. The fronds are generally flaccid and pendent, or stiffer and suberect, and overlap each other, forming large constantly spreading patches; and the individuals are generally abundant.

- a. —Margins of the fronds and lips of the involucre spinulose dentate.
  1. *H. tunbridgense*, Smith.
  2. *H. fucoides*, Swartz.
  3. *H. Houstonii*, Jenm.
- aa. —Margins plain.
- b. —Fronds glabrous.
- c. —Fronds lobed or pinnatifid, segments simple, forked or lobed.
  4. *H. abruptum*, Hook.
  5. *H. asplenoides*, Swartz.
- cc. —Fronds decom pound.
- d. —Segments flat.
  6. *H. vincentinum*, Baker.
  7. *H. paucicarpum*, Jenm.



8. *H. polyanthos*, Swartz.  
 9. *H. protrusum*, Hook.
- dd.* —Segments undulate or crispate.  
 10. *H. clavatum*, Swartz.  
 11. *H. dejectum*, Baker.  
 12. *H. undulatum*, Swartz.  
 13. *H. axillare*, Swartz.  
 14. *H. crispum*, H.B.K.  
 15. *H. valvatum*, Hook and Grev.
- bb.* —Fronds ciliate.
- ccc.* —Fronds linear-oblong.
- ddd.* —Rachis winged.  
 16. *H. latifrons*, V.D.B.  
 17. *H. lanatum*, Fée.  
 18. *H. hirsutum*, Swartz.  
 19. *H. elegantissimum*, Fée.
- dddd.* —Rachis free, or only winged at the top.  
 20. *H. antillense*, Jenm.  
 21. *H. lineare*, Swartz.  
 22. *H. sericeum*, Swartz.  
 23. *H. elegantulum*, V.D.B.
- cccc.* —Fronds oblong or ovate-lanceolate.
- ddddd.* —Rachis winged throughout.  
 24. *H. ciliatum*, Swartz.  
 25. *H. boryanum*, Willd.  
 26. *H. microcarpum*, Desie.
- dddddd.* —Rachis free at the base.  
 27. *H. hirtellum*, Swartz.  
 28. *H. kaieeteurum*, Jenm.  
 29. *H. Catherinæ*, Hook.

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1. *H. tunbridgense*, Smith.—Stipites scattered along the filiform rootstock,  $\frac{1}{2}$ –1 in. l., slender wiry; fronds linear-oblong, tapering outwards, bi-tri-pinnatifid,  $1\frac{1}{2}$ –3 or 4 in. l.  $\frac{1}{4}$ – $\frac{1}{2}$  in. w., nearly or quite naked, the filiform rachis, more or less flexuose, narrowly margined above the usually free base; pinnae distant below, pinnatifid, the pinnulae forked or simple, about  $\frac{1}{4}$  in. l. and nearly as wide, more or less flabellate-pinnatifid, the base cuneate; ultimate segments linear, blunt,  $\frac{1}{6}$ – $\frac{1}{4}$  li. w., 1–2 li. l. with a simple vein in each; margins spinulose-serrate; sori small, stipitate, axillary along the rachis, usually confined to the upper two-thirds or half of the frond; involucre ovate, divided nearly to the base, the lips more or less distinctly serrate-dentate. Hook. Brit. Ferns, t's 43 and 44.

Jamaica, on branches, decaying logs, and other surfaces in forests at from 5,000 to 7,000 feet elevation. A much smaller species than the next, with a glistening metallic hue in growth. In some cases the pinnae are regularly pinnatifid, but generally their outline is subflabellate-pinnatifid. A native of Britain and widely spread in both the North and South Temperate Zones.

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2. *H. fucoides*, Swartz.—Stipites scattered on a thread-like rootstock, 1–2 in. l.; fronds dark-green, spinulose-serrate, oblong or ligulate-oblong, tapering outwards, bi-tri-pinnatifid, 3–7 in. l.,  $\frac{3}{4}$  to  $1\frac{1}{2}$  or 2 in. w., rachis winged above; pinnae spreading,  $\frac{1}{2}$ –1 in. l.,  $\frac{1}{4}$ – $\frac{1}{2}$  in. w., deeply pinnatifid, the divisions simple or forked; segments linear, obtuse, often retuse,  $\frac{1}{2}$ –1 li. w. 2–4 li. l.; veins raised, simple in the lobes; sori 1–2 to each pinna, occupying sup-

pressed lobes at the base on the superior side; involucre variable, broadly ovate or ovate-oblong; divided nearly to the base, which is free or slightly immersed, lips serrate-dentate or rather incised, but occasionally plain, mostly repand. Hk. Icon. Fil. t's 963, 148, 208.

West Indies and Guiana generally, in the deep shade of forests near streams and in other very damp situations at high elevations; differs from the preceding by its broader parts and much larger size. The lower pinnae are often flabellate-pinnatifid; in other cases all are regularly pinnatifid. Widely spread through Tropical America.

3. *H. Houstonii*, Jenm.—Rootstock and stipites not seen; fronds lanceolate, broadest below, 4 in. l.  $1\frac{1}{2}$  in. b., tri-pinnatifid; pinnae sub-distant, obliquely spreading,  $1-1\frac{1}{4}$  in. l.  $\frac{1}{2}$  in. b. at the base; pinnulae lax, flabellate-digitate, once, twice or thrice forked; ultimate segments not widely divergent, linear,  $\frac{1}{2}$  li. b. 1-2 li. l., a single vein in each; rachis filamentose, winged throughout, of equal width with all the other parts; margins spinulose and slightly crisped; fructification not seen.—Journ. Bot. 1886, p. 42.

Jamaica. This is in Sloane's Plts. p. 140 in the British Museum. These are two imperfect fronds on the sheet. It comes nearest *H. tortuosum*, Hk. and Gr. of temperate South America, but is a much laxer plant. All the vascular framework is throughout membraned to exactly the same width.—Endemic.

4. *H. abruptum*, Hook.—Stipites scattered, filiform, wiry,  $\frac{1}{2}-1$  in. l.; fronds thinly membranous, yellowish green, oblong,  $\frac{1}{2}-1\frac{3}{4}$  in. l.  $\frac{1}{2}-\frac{3}{4}$  in. w., terminating abruptly at both ends, deeply cut to a distinctly winged hair-like flexuose rachis into close erect-spreading, linear-oblong, blunt and rounded and slightly retuse,  $\frac{1}{2}-1$  li. w. 2-6 li. l., simple or forked segments, with a simple vein in each; sori confined to one or two, or at the most a few, suppressed lobes at the very top of the frond; involucre rather large, immersed from  $\frac{1}{3}$ rd to  $\frac{3}{4}$ ths their depth, to which point the valves are open, lips rounded; receptacles exerted.—Hook. Sp. 1 t. 31, B.

Jamaica and Guiana; infrequent on decaying logs in lax patches in damp forests and more open situations from 1000-2000 ft. alt. and perhaps higher. Usually the primary divisions are simple but in the larger fronds the inferior ones are forked. It is marked by its simple division, pale lurid colour, and the few large sori confined to the top of the frond, the plane of which they are transverse with.—Cuba to Brazil.

5. *H. asplenioides*, Swartz.—Stipites scattered, filiform, 1-2 in. l.; fronds linear-oblong (or sometimes oblong) or ligulate, usually narrowing but slightly, finger-like, the end abrupt or obtuse-pointed, 2-7 in. l.  $\frac{1}{2}-1$  in. w., lobed or pinnatifid to the broadly winged and flexuose thread-like rachis; primary divisions hand-shaped, generally uniform, the inferior ones  $\frac{1}{4}-\frac{3}{4}$  in. l. and 2-4 li. w., with an open, oblique and decurrent, rounded sinus between them again more or less lobulate, in some cases becoming gradually simple in the outer part of the frond; segments obtuse and rounded, to a large extent soriferous, a line or less wide and deep; veins lax, pinnate or forked in the lower part of the frond, forked or simple in the upper, the ends falling short of the tips of the segments; sori copious; involucre rather compressed, nearly orbicular, attached by the full width of the base, to which point the valves open; lips rounded, quite plain, enclosing the sori at the base.—Hook. Icon. Pl. t. 957.

Forming wide patches, chiefly on the trunks of trees at high altitudes, the fronds hanging and over-lapping each other; a very distinct species, the least deeply divided in leaf of any in the genus. The valves of the involucre remain closed, and like the other parts are lucent, showing the sori at the base within, with a free margin beyond.—Cuba to Brazil.

6. *H. vincentinum*, Baker.—Fronds linear-oblong, 2-3 in. l.  $\frac{1}{2}$ - $\frac{3}{4}$  in. w. (rarely 2 in. w.) of equal width from base to top, dark green, membranous, naked, bi or tripartite; pinnae contiguous, rhomboidal, sessile and decurrent at the base forming a narrow wing to the rachis, sub-flabellate; final segments obtuse  $\frac{1}{2}$  li. w. with a simple vein in each; sori large, one to several, clustered at the top of the frond to which, on suppressed segments, they are confined; involucre deeply cleft, the valves acute-rounded.—Anals. Bot. vol. 5, p. 164, pl. 10.

a. var. *latifolium*, Baker.—Fronds twice or thrice broader by the extension of the pinnae.

St. Vincent and Grenada in damp forests at 1,500 ft. alt.; resembling the next in cutting and fructification, differing by the linear-oblong, or finger, shape of the fronds.

7. *H. paucicarpum*, Jenm., n. sp.—Stipites scattered, slender, stiff, wiry,  $\frac{1}{2}$ - $1\frac{1}{2}$  in. l., slightly margined; fronds  $\frac{1}{2}$ -2 in. l.,  $\frac{1}{4}$ -1 in. w., oblong and usually terminating rather abruptly, tri-pinnatifid; pinnae spreading, sessile, apart or close, sometimes imbricating,  $\frac{1}{4}$ - $\frac{3}{4}$  in. l., 2-5 li. w.; pinnulae forked or flabellate-pinnatifid, the lowest superior ones overlapping the rachis; ultimate segments linear, obtuse-retuse,  $\frac{1}{4}$  li. w., the free portion 1-2 li. l., the margins usually quite plain; rachis very narrowly winged throughout; sori confined to the apex of the frond, crowded together, terminal on shortened lobes of which they are much wider, one or two or several; involucre large, ovate-oblong, the base cuneate and winged with membrane; lips rounded, open; receptacles often slightly exserted.—Bull. Bot. Dept., Jamaica, Aug., 1890, p. 4.

Jamaica; infrequent on decaying logs in coffee fields and forests from 2000-6000 ft. elevation. There is a small form  $\frac{1}{2}$ -1 in. l., and nearly as wide with crowded imbricating pinnae. In outline and cutting the species resembles exactly some of the smaller forms of *H. polyanthos*, Sw., but in character of the fruit it is quite dissimilar. In this its affinity is with *H. Vincentinum*, Baker and *H. abruptum*, Hook. The sori are large and crowded together, sometimes overlapping and forming a bunch or double row, about the end of the rachis, and number from one to eight, or possibly more.—Endemic.

8. *H. polyanthos*, Swartz.—Stipites scattered, slender, wiry, 1-3 in. l., narrowly winged upwards or throughout; fronds lanceolate or ovate-oblong, dark or cloudy green, membranous, glossy, pendent or suberect, 2-6 in. l., 1-2 in. w., acuminate or not, tri-quadrifid; pinnae mostly close, more or less spreading, or if long often extending sub-parallel with the rachis,  $\frac{3}{4}$ -2 in. l.,  $\frac{1}{4}$ - $\frac{1}{2}$  in. b., mostly sessile; pinnulae spreading, forked or pinnatifid, the lower ones often digitate, flabellate, with the lowest division on the upper side, final segments flat and plain-margined, simple or forked, linear, contiguous,  $\frac{1}{3}$ - $\frac{1}{2}$  li. w., 1-2 or occasionally 3 li. l.; rachis filiform, flexuose, and with the costae narrowly winged throughout to the width of the final pinnules; veins simple in the segments; sori copious, terminal on the lobes of the upper half of the fronds; involucre orbicular or ovate, slightly immersed at the base, to which point they are valvate, the lips rounded or somewhat acute.—Hook & Grev. Icon. Fil. t. 128.

a. var. *sanguinolentum*.—Fronds stiffer and erect, usually truncate and broadest at the base, always acuminate  $1\frac{1}{2}$ -5 in. l., 1-2 in. b., pinnae spreading nearly or quite horizontally, often more apart, final segments  $\frac{1}{4}$ - $\frac{1}{2}$  li. w., mostly shorter more numerous and closer; sori

copious in the upper half or third, smaller; involucre ovate, convex, deeply cleft and open, with acute lips.—*H. sanguinolentum*, Sw.

*c. var reductum* Jenm.—Fronde  $\frac{1}{2}$ –1 in. l.; sori confined to the upper part or apex; involucre rounded at the base, the lips acute.

Abundant throughout the West Indies and Guiana from sea level up to the highest peaks, in forests and on wayside banks; by far the most plentiful of the filmy ferns, and found almost everywhere within the range of altitude mentioned. It presents great variation of habit, size, outline, form of involucre, &c. Spread in varying states throughout the tropics, and a little beyond both North and South of both Hemispheres.

9. *H. protrusum*, Hook.—Stipites scattered, 1–3 in. l. filiform, wiry, narrowly margined upwards; fronds pendant, 3–6 in. l., 1–2 w. oblong-lanceolate, membranous, yellowish green, tri-quadri-pinnatifid; pinnae erecto-spreading,  $\frac{3}{4}$ –2 $\frac{1}{2}$  in. l.  $\frac{1}{3}$ – $\frac{2}{3}$  in. w. contiguous and more or less overlapping; pinnulae digitate-flabellate or pinnatifid mostly close or crowded; final segments simple or fork, linear,  $\frac{1}{3}$ – $\frac{1}{2}$  li. w. 1–2 li. l. from the furcation, rather divergent, flat and plain-margined; veins single in the lobes; rachis winged throughout, flexuose, and with the costulae about the width of the ultimate parts; sori terminal on the segments of the upper half of the frond, small, copious; involucre longer than broad, hardly wider than the leaf-segments, cleft only half down the tube or less, the lips generally open and often somewhat contracted; receptacles in part exerted, often considerably.—Hook Sp. Fil. vol. 1. tab. 37. B.

*a.* Fronds 1–3 in. l.  $\frac{3}{4}$ –1 $\frac{1}{2}$  in. w. stiffish and erect, all the parts very dense, colour as in the type; receptacles infrequently exerted.

Common in the same situations as the preceding and throughout the same range. The two species are closely allied each presenting parallel forms, which resemble each other exactly in habit, cutting, shape of fronds and texture, but they differ generally in colour, form of involucre and the exerted receptacles which characterises this.—Cuba to Brazil.

10. *H. clavatum*, Swartz.—Stipites scattered, suberect, slender, narrowly winged, usually to the base, with membrane, 1–3 in. l.; fronds suberect, tri-quadri-pinnatifid, lanceolate or oblong-lanceolate, acuminate, 3–7 in. l.  $\frac{3}{4}$ –1 $\frac{1}{2}$  or 2 in. w., reduced or not at the base; pinnae spreading, sometimes nearly horizontally, numerous and approximate, sessile,  $\frac{1}{2}$ —over 1 in. l.  $\frac{1}{4}$ – $\frac{1}{2}$  in. w., broadest at the base and tapering outwards, sometimes inserted at an oblique angle with the line of the rachis; pinnulae spreading, 1–2-pinnatifid, the shorter digitate-flabellate, longer pinnatifid; ultimate segments small,  $\frac{1}{4}$ – $\frac{1}{2}$  li. w. about 1 li. l.; retuse or not, undulate or plain; rachis flexuose, the wings undulate or undulate-repand; sori sub-globose, and stipitate, occupying the inferior partially suppressed and contracted lobes of the pinnulae, sparse or plentiful, often exceedingly copious, generally confined to the upper half, less or more, of the frond; involucre cleft nearly or quite to the base, lips rounded, open.—*H. sphaerocarpum*, V.D.B. *H. myriocarpum*, Hkr. Sp. Fil. t. 37. D.

Common in forests on decaying logs and branches of trees at high elevations; best distinguished from *polyanthos* by the shorter and rather more divaricating final segments, globose, stipitate sori, the lobes on which they are borne being reduced and contracted to mere pedicels, the involucre being free of membrane at the base. The fronds vary much in form and degree of undulation.—Common from Cuba to Brazil and Peru.

11. *H. dejectum*, Baker.—Stipites tufted, erect, strong, channelled upwards, dark brown, freely clothed with pale, meal coloured, acuminate, linear scales which form a tuft at the base; fronds oblong-lanceolate or lanceolate, erect, 3–6 in. long,  $1\frac{1}{2}$  ins. wide, tri-quadrifid; dark green, firm in substance, glabrous, the margins plain; rachis stiff, quite free below, above very slightly margined, as are the costæ, the reduced scales of the stipes ascending the base; pinnae horizontal or somewhat deflexed, contiguous,  $\frac{3}{4}$  in. long, multifid; final segments copious, deflexed on the underside of the frond, linear,  $\frac{1}{6}$  line wide, obtuse pointed, with a simple vein in each; sori copious, axillary but stipitately, with a free leaf segment on the outer side; involucre globose, the mouth more or less deeply cleft, open and dentate round the lips; receptacles often exserted.—Trans. Linn. Soc. N. S. Bot. II., 289.

Guiana, Mt. Roraima, 5,000–7,000 ft. alt. A very distinct species, with peculiar characteristics in several of its features. Judging by the strong, stiff, wiry petioles, with the tuft of pale, meal coloured scales at their base, the rootstock must be terrestrial, with probably strong descending roots as in the terrestrial species of *Trichomanes*, such as *rigidum*. Like the denser fruited forms of *H. clavatum*, which it resembles in form, habit and cutting, the final segments are multifid, and recurved on the underside, so that on the upperside the sori are not observable, while beneath they are abundant or crowded. In growth the parts are plain, but shrunk and undulate when dry. The sporangia are relatively large, completely girdled, and sessile on a cushion-like receptacle. Endemic.

12. *H. undulatum*, Swartz.—Stipites scattered,  $\frac{1}{2}$ –2 ins. long, not membrane-margined; fronds a pale, yellowish green, oblong, generally acuminate, not or little reduced at the base; 2–4 ins. long,  $\frac{1}{2}$ – $\frac{3}{4}$  in. wide, tri-quadrifid; pinnae spreading nearly horizontally but generally curved upwards in the outer part, close and imbricating, inserted at an oblique angle with the line of the rachis,  $\frac{1}{2}$  an inch long or less,  $\frac{1}{4}$  inch wide, sessile, oblong; pinnulae crowded and overlapping, quite concealing the rachis on the underside of the frond, forked or digitate, flabellate; ultimate lobes overlapping, less than  $\frac{1}{2}$  line wide, a line or less long, occasionally retuse, undulate, crispate; rachis flexuose, the wings narrow and undulate; sori globose, very copious, pedicellate; involucre cleft to the base, the lips rounded and open, revealing the sporangia.—Hk. & Grev. Icon. Fil. t. 964. Cent. Ferns t. 64.

Jamaica; a Swartzian species not with certainty rediscovered since, but resembling the denser states of *clavatum* to which they probably belong, or it to them. My description is taken from the Swartzian specimens in the Kew Herbarium.

13. *H. axillare*, Swartz.—Stipites hair-like, 1–2 in. l., pendent, not margined; fronds pendent, 3–9 in. l.  $\frac{1}{2}$ – $\frac{3}{4}$  in. w., dark or light green, thin, weakly pliant, plain or more or less undulate-crispate, tripinnatifid, about the same width throughout; pinnae very numerous, erecto-spreading crowded, or occasionally lax at the base,  $\frac{1}{4}$ – $\frac{1}{2}$  in. l., or sometimes irregularly much more, 2–4 li. w.; pinnulae much crowded and overlapping, pinnatifid, undulate or crispate, as are also the wings of the flexuose, thread-like rachis; ultimate segments  $\frac{1}{4}$  li. w. 1 li. or less l. retuse; sori generally very abundant, terminal on the ultimate lobes, globose or compressed; involucre orbicular, as

broad as the leaf segments, which are not contracted, attached usually the width of the base, to which they are divided; the lips rounded and frequently open.—Hook. and Grev. Icon. Fil. t. 124, *H. apicale*, V. D. B.

Jamaica. Very abundant on rocks and mossy banks in forests and by way sides above 5000 ft. altitude, forming extensive patches. Frequently the sori are so abundant as to occupy, and nearly conceal, the whole leafy portions of the fronds. The latter often develop lateral frond-like branches which are also pendent, the fronds becoming thus in some cases 2-3 in. w., the elongated pinnae hanging side by side. The rachis is not winged uniformly, it is the pinnae that are decurrent upon it.—Cuba, Haiti, St. Vincent to Venezuela.

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14. *H. crispum*, H. B. K.—Stipites hair-like, pendent,  $\frac{1}{2}$ - $1\frac{1}{2}$  in. l., not margined or only slightly at the top; fronds pendent linear-oblong densely crispate, 2-6 in. l.  $\frac{1}{4}$ - $\frac{3}{4}$  in. w., bright yellowish, about the same width throughout, tri-pinnatifid; the flexuose filiform rachis margined throughout, pinnae  $\frac{1}{4}$ - $\frac{3}{4}$  in. l. close 2-4 li w.; pinnulae pinnatifid, crowded and densely overlapping; ultimate lobes about  $\frac{1}{4}$  li. w.  $\frac{1}{2}$ -1 li. l.; sori small, very abundant, globose, terminal, occupying most of the lobes; involucre roundish, broadly attached at the base, slightly broader or not than the leaf-segments, which though much crisped is not contracted; lips rounded, crispate.—Hk. & Baker, Syn., Fil. p. 59. *H. amœnum*, Sturm.

Jamaica, above 2000 ft. elevation, growing on logs in coffee fields and in forests, and on sheltered wayside banks. The fronds are so densely crisped, even to the tips of the segments and lips of the involucre, that the margins appear as if toothed. When growing it has a bright pale golden colour, which appears as if frosted and glistens to the view. Like *axillare* it has the habit of occasionally extending the pinnae in the larger fronds into frond-like branches and so giving them an abnormal shape.—Cuba to Mexico, Brazil and Peru.

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15. *H. valvatum*, Hook and Grev.—Fronds oblong-lanceolate, the base truncate the apex attenuate, 4-6 in. l.  $1\frac{1}{2}$ - $2\frac{1}{4}$  in. w., tripinnatifid, membranous, naked, brown-green, crispate, rachis and costae winged and slightly flexuose; pinnae spreading horizontally, rhomboidal-oblong, sessile, contiguous, 3- $1\frac{1}{4}$  in. l.  $\frac{1}{2}$ - $\frac{3}{4}$  in. w.; pinnulae flabellate, cut nearly to the axis into obtuse final segments  $\frac{1}{2}$ - $\frac{3}{4}$  li. w. and 1-3 li. l. with a simple vein in each; involucre ovate-pointed, valves finally open, even-edged, naked.—Hook and Grev Icon. Fil. t. 219.

St. Vincent, in mountain forests. The fronds have the size and cutting of polyanthos, but all the parts are open undulate-crispate throughout West Indies.—French Islands to Peru.

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16. *H. latifrons*, V. D. B.—Rootstock, thread-like, flexuose, ciliate; stipites paced  $\frac{1}{2}$ - $1\frac{1}{2}$  in. apart, slender, 1-3 or 4 li. l., ciliate, fronds oblong, 1-4 in. l.  $\frac{3}{4}$ -1 in. b., pinnatifid, thinly membranous, brown-green, densely ciliate with aureous-tinged hairs; midribs winged, filiform, slightly flexuose; segments linear, obtuse, erectopatient, close, decurrent, few or many, simple or in the larger fronds forked,  $\frac{1}{4}$ - $\frac{1}{2}$  in. l.  $1\frac{1}{2}$  li. w. with a simple vein in each; sori terminal; involucre orbicular, partly immersed, densely ciliate.

St. Vincent, in forests and ravines at high elevations, similar to *lanatum* in cutting but with much broader parts, the copious vestiture having a beautiful aureous tinge.

17. *H. lanatum*, Fée.—Stipites hair-like,  $\frac{1}{2}$ – $1\frac{1}{2}$  in. l., deciduously ciliate, fronds pendent, grayish, flaccid and soft, stellato-ciliate; oblong, or linear-oblong,  $\frac{1}{2}$ – $2\frac{1}{2}$  in. l.,  $\frac{1}{4}$  to  $\frac{1}{2}$  in. w., nearly uniform in width throughout, or tapering upwards, the base usually cuneate and the apex blunt, regularly pinnatifid throughout the winged hair-like rachis; pinnae close, parallel, linear, erecto-spreading, 2–6 li. l.,  $\frac{1}{2}$ –1 li. w. obtuse, in general simple but with an odd one occasionally forked; sori terminal on the upper lobes or occasionally on all; involucre nearly orbicular, the base immersed, hardly so wide as the lobe, divided over half-way down; valves rounded and densely ciliate.—Fée Fil. Ant. tab. 31, fig 3.

Frequent in forests and on wayside banks at high elevations. The fronds vary somewhat in shape, but are generally oblong or linear-oblong. West Indies generally and the tropical mainland.

18. *H. hirsutum*, Swartz.—Stipites hair-like,  $\frac{1}{2}$ – $1\frac{1}{2}$  in. l. deciduously ciliate, pendent; fronds pendent, pale or dark gray, copiously stellato-ciliate, flaccid and soft, linear-oblong, obtuse, usually broadest at the base, thence tapering, finger-like, outwards, 3–5 in. l.,  $\frac{1}{4}$ –1 in. w., bi-pinnatifid, the hair-like rachis broadly winged to the base; pinnae erecto-spreading, approximate, subflabellate, base cuneate outer margin oblique with the rachis, and lobed or pinnatifid,  $\frac{1}{4}$ – $\frac{1}{3}$  in. w. and d., lobes less than a line wide, close the tips, fertile; veins forked, simple in the lobes, involucre roundish, rather narrower than the leaf segments, the base immersed, cleft about  $\frac{2}{3}$  deep; lips rounded, closed or open, and densely stellato-ciliate.—Hk. & Grev., Icon. t. 84.

Abundant in forests and on wayside banks forming large patches, at high altitudes. The fronds vary little in cutting, and typically the pinnae are triangular in outline, the inner and inferior margins being entire and plain and the outer lobed, together forming the cuneate or flabellately-pinnatifid outline. The inner margin is more or less sub-parallel with the rachis. West Indies generally Mexico to Brazil and Peru.

19. *H. elegantissimum*, Fée.—Stipites hair-like,  $\frac{1}{2}$ – $1\frac{1}{2}$  in. l. not margined but with the wings of the rachis very shortly decurrent at the top, nearly or quite glabrous; fronds lax, pendent, of a uniform width to near the apex, 3–7 in. l.  $\frac{1}{2}$ –1 in. w. or rarely over, bipinnatifid, dark brown, thin and flaccid, glabrescent or thinly ciliate, the margins conspicuously undulate or undulate-crispate, the rachis hair-like, flexuose, and freely winged throughout; pinnae distant or subdistant, very lax,  $\frac{1}{4}$ – $\frac{1}{2}$  in. l.,  $\frac{1}{4}$  in. w., composed of 3–6 divaricating linear lobes, which correspond in width to the winged rachis, and are from  $\frac{1}{2}$  to nearly 1 li. w. and 2–6 li. l., blunt and retuse, apart, and alternate on each side of the costae; sori small, terminal, variable in quantity, occupying few or many of the lobes; involucre circular, attached by the full breadth of the base, to which they are valvate; lips rounded, freely ciliate Fée, Fil. Ant. tab. 29, fig. 2.

Jamaica; abundant, forming large patches on trees in forests above 5,000 ft. altitude; distinguished from *hirsutum* by its exceedingly lax habit, and undulate-crispate margins. The pinnae are  $\frac{1}{4}$ – $\frac{1}{2}$  in. apart, and the lobes are relatively separated. All the parts—the winged rachis, costae and lobes—are the same uniform width. The pinnae, especially when the lobes are more than two or three, are distinctly pinnatifid in their manner of cutting, that is the segments spread from both sides, though in an oblique outward direction, the end of the costae forming a terminal lobe. Occasionally the pinnae are simply forked.—Guadaloupe

20. *H. antillense*, Jenm.—Stipites pendent, hair-like, flexuose, 1-3 in. l., not margined, glabrescent; fronds flaccid, grayish, copiously stellato-ciliate, pendent,  $\frac{3}{8}$ -8 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. w. at the base, diminishing very gradually to the apex, which is a  $\frac{1}{4}$  in. or less w., bipinnatifid; rachis hair-like, straight or very slightly flexuose, margined inconspicuously above, the lower part quite free, more or less ciliate; pinnae variable, the upper ones approximate, composed of 2-4 lobes each, the lower subdistant or distant and usually pinnatifid, with few or several simple lobes on each side, the former 2-3 li. each way, the latter  $\frac{1}{4}$ - $\frac{3}{4}$  in. l., 2-3 li. w., all cuneate at the base, lobes linear,  $\frac{1}{2}$  li., w., 1-2 li. l., blunt; sori small, terminal, occupying the majority of the lobes, sometimes all; involucre inserted to  $\frac{1}{3}$  their depth at the base, to which they are cleft; lips rounded, densely stellato-ciliate with a pale lanate pubescence.—*Journ. Bot.* p. 18.

Jamaica and Guiana; infrequent forming large masses on trees in forests at the higher elevations; exactly intermediate in its characters between *hirsutum* and *lineare*. From the former, which it resembles in the form of its pinnae, it differs by its slender, laxer habit, and the rachis being entirely free in the lower part; while from the latter, which it approaches in its lax habit and slender filiform rachis, it is distinguished by the compact, less pinnatifid, superior pinnae, its uniform tapering fronds, and the rachis being winged in the upper half or two-thirds.

21. *H. lineare*, Swartz.—Stipites pendent, not margined, hair-like, 1-2 in. l. glabrescent; frond bi-tri-pinnatifid, pendent, pale or rusty gray, freely stellato-pubescent, soft,  $\frac{1}{4}$ - $\frac{3}{4}$  in. w. or often much more by the frond-like extension of the pinnae, 3-6 in. l. nearly a uniform width throughout; pinnae approximate or subdistant, spreading, the base cuneate, very variable, from  $\frac{1}{4}$ -2 or 3 in. l., 2-6 li. w., composed of 2-3 spreading lobes which are from  $\frac{1}{4}$ - $\frac{1}{2}$  li. w. 1-3 li. l., linear, those of the superior pinnae widely divaricating, the lower (pinnatifid) ones spreading at an acute angle right and left; the elongated pinnae being bi-pinnate; rachis not margined, hair-like, flexuose; sori terminal on the segments, plentiful or sparse; involucre broader than deep, the base immersed; lips rounded and densely tawny pubescent.—Hook. & Grev. *Icon. Fil.* t. 196. *H. trifidum*, *Hk. & Grev.*

Very common on trees in forests, forming large much tangled masses at the higher altitudes; at once distinguishable by its very delicate flaccid habit, and quite free very filiform rachises. The fronds appear to extend indefinitely, the older pinnae dying and dropping away, leaving the naked rachises; a patch of the plant pulled away from its supporting surface, appears like a mass of much interlaced hair. By extending its pinnae into frond-like branches, a frond is sometimes found nearly as broad as one's hand.—West Indies, and Mexico to Brazil and Peru.

22. *H. sericeum*, Swartz.—Stipites pendent, not margined, at first ciliate, wiry, 1-3 ins. long; fronds fully pinnate below, pinnatifid upwards, pendent  $\frac{1}{2}$ -1 $\frac{1}{2}$  ft. long, 1-1 $\frac{1}{2}$  or 2 ins. wide, the same width throughout, both sides a tawny gray brown, striated, densely stellato-ciliate, which vestiture conceals the rachis, flaccid, but thickish; pinnae very numerous, close, decurrent, those at the top connected,  $\frac{3}{4}$ -1 $\frac{1}{2}$  ins. long, about  $\frac{1}{4}$  in. wide, oblong or lanceolate-oblong, mostly somewhat curved and tapering to an acute or blunt point, incise-serrate-lobate along both margins, or in cases pinnatifid, the inferior margin cut away at the base, the upper expanded, lobes  $\frac{1}{2}$  to over 1 line wide, simple or the basal ones united, chiefly in pairs, very oblique, veins pinnate, the branches forked and simple, very oblique,



terminating in the tooth-like lobes; sori mostly confined to the outer lobes of the pinnæ, small; involucre roundish, immersed more than half their depth, the lips rounded and very densely tomentose.—Pl. Fil. t. 73.

Frequent at 2,000-3,000 ft. altitude in forests, coffee fields, and half-sheltered places. As the fronds, which are sometimes two feet long, extend, the older pinnæ die and become dark brown, and at length shred away; so that all the longer fronds appear dead one-third or half their length, from the base outwards. It prefers to grow on the underside of branches, where the fronds have room to hang down quite straight, free from each other and from everything else. The coating of the paler growing top of the fronds, and of the involucre, is almost shaggy.—Cuba to Mexico Peru and Brazil.

23. *H. elegantulum*, V. D. B.—Rootstock wiry, rusty-tomentose, wide spreading; stipites scattered, wiry, densely rusty-pilose, 1-2 in. l.; fronds pendent,  $\frac{1}{2}$ -1 $\frac{1}{2}$  ft. l., 1-2 in. w. pinnate or bi-pinnatifid, flaccid but firm in substance, densely rusty-pilose, dark brown; rachis wiry, flexuose, partly winged by the decurrent pinnæ, which are  $\frac{1}{2}$ -1 $\frac{1}{2}$  in. l.,  $\frac{1}{4}$ - $\frac{1}{3}$  in. w. apart, subrhomboidal and somewhat dimidiate the inferior base being shortly cut away, the end obtuse, lobed throughout and sometimes pinnatifid, the lobes about 1 li. w. and d., emarginate in the larger fronds; sori terminal on the lobes, copious; involucre immersed at the base, narrower than the lobes, orbicular most densely villose.—*H. pulchellum*, Hook Sp. Fil. vol. 1, t. 33, A.

Jamaica, McFadyen; Trinidad, Prestoe. A species very similar to *sericeum*, but usually of broader parts, deeper lobing and quite different colour, and often, varying much in width in the same fronds. The vestiture, too, is denser and of a bright castaneous tinge on a darker leather brown surface—Andes of Ecuador and Peru.

24. *H. ciliatum*, Swartz.—Stipites erect or sub-erect, winged upwards, usually rather broadly, rusty tomentose,  $\frac{1}{2}$ -1 in. l.; fronds oblong, or oblong-lanceolate, acuminate or obtuse, dark brown, freely stellato-ciliate, especially on the margins, 1 $\frac{1}{2}$ -3 $\frac{1}{2}$  in. l.  $\frac{1}{2}$ - $\frac{3}{4}$  in. w.; pinnæ close or approximate,  $\frac{1}{3}$ - $\frac{1}{2}$  in. l. about a  $\frac{1}{4}$  in. w., the incised end rounded or only obtuse; pinnatifid, the inferior pinnule on the upper side being sometimes bifid; lobes 3-5 to a side, at an acute angle, the free part 1-2 li. l.  $\frac{1}{2}$  li. w. point obtuse; veins simple in the final segments; sori terminal, generally occupying all the lobes of the upper half of the frond; involucre orbicular, cleft to the base, the breadth of which they are attached, as broad or rather broader than the leaf-segments; lips rounded, densely stellato-ciliate.—Hook and Grev. Icon. Fil. t. 35.

Generally and plentifully distributed from low to high altitudes; growing on trees, mossy logs, rocks and boulders. The characters that distinguish it are,—its small compact habit, rather large and strictly orbicular, densely tomentose, involucre, which occupy every lobe of the upper part of the frond, and, for its size, relatively broad parts. Where the fronds are acuminate, the lobes at the top are simple, the pinnæ being gradually reduced to this. Spread generally throughout Tropical America, both Islands and Mainland.

25. *H. Boryanum*, Willd.—Stipites 1-2 ins. long, erect, winged upwards, rusty-stellato-ciliate; fronds ovate, lanceolate, or oblong-lanceolate, more or less acuminate, bi-tri-pinnatifid, 3-9 ins. long,  $1\frac{1}{4}$ -2 ins. wide, thin, dark brown, stellato-ciliate, especially at short intervals on the margins; pinnæ spreading, approximate or sub-distant, about 8 to a side not including 2-3 lobes at the top into which they gradually pass, oblong,  $\frac{1}{3}$ -1 in. long,  $\frac{1}{3}$ - $\frac{1}{2}$  in. wide; deeply

pinnatifid, the inner pinnulæ being again incised and bifid or trifid; segments linear, about  $\frac{1}{4}$  line wide, blunt, 2-3 lines long; veinlets simple in the final segments, or casually forked; sori small, terminal on the lateral lobes of, generally, (only) the upper pinnæ; involucre ovate-oblong, rather wider than the leaf-segment, the base shortly inserted; lips deeply cleft, rounded, ciliate, mostly filled by the sporangia, and becoming thus sub-globose.—Hook. Sp. Fil. t. 31, fig. C.—*H. goratum*, Fée Fil. Ant. t. 30, fig. 1.

Frequent in mountain forests at about 2,000 ft. elevation; intermediate between *hirtellum* and *ciliatum*, from the latter of which it differs in the size and shape of the involucre, and the larger and more laxly divided fronds. The involucre are so thin as often to appear under the lens reticulated with the pressure of the sporangia within. There are three distinct forms—a broadly ovate one, a linear-oblong one and, the largest of all, an oblong, lanceolate one, the fronds of which occasionally reach a foot in length. General throughout Tropical America, and also Asiatic.

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26. *H. microcarpum*, Desv.—Stipites strong, erect or suberect, deciduously tomentose, rather broadly winged upwards, as is also the stiff stellato-ciliate rachis, 2-6 in. l.; fronds lanceolate, or ovate-lanceolate, rather long-acuminate, broadest at the base, 3-7 in. l.;  $1\frac{1}{2}$ - $3\frac{1}{2}$  in. w., thin and elastic and more or less ciliate or glabrescent, darkgreen, tri-quadri-pinnatifid; pinnæ spreading, approximate, lanceolate acuminate, the base expanded on the upper side and cut away rather on the under,  $1-2\frac{1}{2}$  in. l.,  $\frac{1}{2}-\frac{3}{4}$  in. w., pinnulæ close, oblong, deeply cut into several linear obtuse or acute lobes, which are close and directed outwards at a sharp angle,  $\frac{1}{4}-\frac{1}{3}$  li. w.; 1-2 li. l., the basal ones usually once or twice bifid; sori very small, terminal on the lobes, occupying few or many on the outer part of the pinnæ, sometimes all throughout the frond; involucre ovate, very small but somewhat variable as to size, broader than the constricted end of the leaf-segment, divided to the cuneate base, the lips acute or pointed, not ciliate *H. Organense*, Hock. Sp. Fl. vol. 1. t. 32 B.

Frequent in forests on rocks and banks at mean and high altitudes. The top of the frond and all the pinnæ terminate in a simple linear segment, which is often rather elongated. The general aspect is of a very multifid composition. The vestiture is variable, some fronds being almost quite naked. They vary too, much in size, the largest a span and a half long. The segments have a sharp-pointed look in some fronds. Jamaica to Venezuela Guiana and Brazil and Ecuador to Peru.

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27. *H. hirtellum*, Swartz.—Stipites erect or sub-erect, rather strong, not margined, rusty-tomentose, 2- $3\frac{1}{2}$  in. l., fronds sub-erect, ovate-acuminate, or less frequently lanceolate, tri-quadri-pinnatifid, 3-6 in. l.  $1\frac{1}{2}$ -3 in. w.; usually broadest at or near the base, freely rusty stellato-ciliate; rachis winged upwards, free below, rusty stellato-tomentose, strong, rather flexuose; pinnæ closely approximate, spreading, upcurved somewhat, lanceolate or oblong-lanceolate, the larger acuminate, slightly decurrent and cut away on the underside at the base, the lowest pinnula on the opposite upper side being near the axil,  $\frac{1}{2}-\frac{3}{4}$  in. w., 1-2 in. l., bi-pinnatifid; pinnulæ oblong or ovate-oblong,  $\frac{1}{3}-\frac{1}{2}$  in. l., 2-3 li. w., sessile and decurrent, deeply pinnatifid, the lowest lobe on the outer side being usually bifid; ultimate segments linear, close, about 3-5 on each side of the pinnulæ,  $\frac{1}{4}$  li. or more w. the free portion 1-2 li. l. sori terminal, usually confined to the lateral ultimate lobes, involucre generally nearly orbi-

cular, immersed about half their depth, to which the rounded valves, are open, and densely stellato-tomentose.—Hook. Sp. Fil. t. 31 D.

Common, with the same altitudinal range as the preceding in forests and on shaded wayside mountain banks. This resembles *microcarpum* in shape and size, from which it is well distinguished by its rounded involucre, denser pilosity, and the rachis being devoid of membrane at the base. The fronds generally appear rather unequal-sided, by the alternation of the pinnæ making one side conspicuously longer than the other, though this is not an invariable character. The larger fronds are decidedly ovate with generally copious sori.—West Indies and Mexico southward.

28. *H. kaieteurum* Jenm. n. sp.—Rootstock thread-like, flexuose, ciliate; stipites scattered,  $\frac{1}{4}$ – $\frac{1}{2}$  in. l. broadly winged to near the base, ciliate; fronds varying in shape from oblong to ovate lanceolate, truncate at the base, the apex often attenuate, bi-tri-pinnatifid, 1–3 in. l.  $\frac{1}{2}$ – $1\frac{1}{2}$  in. w. thinly membranous, brown-green, ciliate, slightly crispate, rachis winged and wavy; pinnæ sessile, decurrent, ovate-oblong, cut once or twice into obtuse final segments  $\frac{1}{2}$ – $\frac{3}{4}$  li. w. and 1–3 li. l. with a simple vein in each; involucre pointed or orbicular, ciliate, the margins of the valves densely bristly.—*H. ciliatum* var. *crispatum*, Baker in part.

Guiana, forests of the Potaro river and other regions; a variable species one of the forms having only few distant forked pinnæ, with open  $\frac{1}{4}$ – $\frac{1}{2}$  in. l. freely crenulate segments. It has the habit of *valvatum* but is much smaller, hairy and with short broadly winged petioles.

29. *H. Catherinæ*, Hook.—Stipites slender, wiry, flexuose,  $\frac{1}{2}$ – $1\frac{1}{2}$  in. l., with a few minute scales or glabrescent; fronds erect, tri-pinnatifid, sparsely stellato-ciliate, thinly membranous,  $1\frac{1}{2}$ –3 in. l.  $\frac{1}{2}$ –1 in. w., oblong, or the larger lanceolate-oblong, usually more or less reduced at the base; rachis slender but stiff and wiry, somewhat flexuose, free below but very narrowly winged in the upper part; pinnæ spreading,  $\frac{1}{4}$ – $\frac{3}{4}$  in. l.  $\frac{1}{4}$ – $\frac{1}{2}$  in. w., sessile, approximate, pinnatifid or bi-pinnatifid, oblong or ovate with spreading simple, forked, or pinnatifid pinnulæ; final segments linear or linear-acicular  $\frac{1}{6}$ – $\frac{1}{4}$  of a li. w. 1–2 li. l., lax in arrangement, ribs throughout slightly margined; sori minute, terminal on the lobes of the upper part of the fronds, occupying few, many, or all; involucre orbicular or deeper than wide, conspicuously wider than the leaf-segments; lips cleft to the base, freely ciliate, little or much exceeding the sori, open and rather crenulato-undulate.—Hk. & Baker Syn., Fil. p. 67.

Jamaica.—Common on trees, in large patches, in forests at high altitudes. Though exceedingly slender in all its parts and multifid, this is the most wiry and stiffest species of the lot, and quite unique in habit and character. Small fronds in a barren state somewhat resemble those of *tunbridgense*, from which however in specific characters it is widely separated. The fronds are so stiff that it is difficult to glue them on the mounting paper. They form a set of wiry filiform ribs very slightly lined on each side with membrane and are sometimes quite plumose. The fertile segments are distinctly clavate. The valves of the involucre often gape considerably, occasionally turning quite down.—Guadeloupe.

GENUS II.—*Trichomanes*, *Smith*.

SORI marginal, rather oblong or columnar, enclosed by the inferior involucre, which are tubular or urnshaped, the mouth truncate, more or less dilated with a spreading rim, or bilabiate; receptacles filiform; formed of the exerted veins, often elongated beyond the sori and involucres; fronds rarely dimorphous, very variable and diverse in size and cutting; rootstock variable, thread or cord-like and free-creeping, or, rarely, short and erect, the former being epiphytal and the latter terrestrial as a rule.

As in its wide general distribution, this is in the West Indies and Guiana a larger genus than the preceding. It is distinguished by the entire urceolate or tubular form of the involucres. These are more or less immersed in the lamina, to the rim often, winged at the sides in other cases, or, in others again, quite free. Both body and mouth vary a good deal in form. In some instances the former is strictly tubular—that is, not wider at the mouth than below, while more generally it widens gradually from the base upwards in the form of a rimmed vase. The form of the mouth varies still more. It is strictly truncate, occasionally even contracted, or with a pair of rounded lips. In some species it presents a concave centre, with lateral horn-like projections. The more general state, however, is a more or less uniformly expanded rim, out-turned or recurved. Some of the entire-leaved species of this genus are the most diminutive of all ferns, being hardly a quarter of an inch long. From these to the larger multifid species, some of which are over two feet long, there is an infinite gradation of size, form and cutting.

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- a. —Fronds small, mouth of involucres bilabiate.
- b. —Fronds entire.
- c. —Fronds  $\frac{1}{4}$  inch long.
- d. —With a single terminal sorus.
1. *T. setiferum*, Baker.
  2. *T. pinnatinerva*, Jenm.
  3. *T. solitarium*, Jenm.
- dd. —With one or more sori.
- ec. —Fronds  $\frac{1}{4}$ – $\frac{1}{2}$  inch long.
4. *T. labiatum*, Jenm.
  5. *T. fruticosum*, Jenm.
  6. *T. punctatum*, Poir.
- bb. —Fronds entire or irregularly lacerated or lobed,  $\frac{1}{4}$ –1 inch long.
7. *T. apodum*, Hook & Grev.
  8. *T. sphenoides*, Kze.
- bbb. —Fronds  $\frac{1}{2}$ –1 or 2 inches long, lobed or pinnatifid.
9. *T. pusillum*, Swartz.
  10. *T. Fraseri*, Jenm.
  11. *T. reptans*, Swartz.
  12. *T. quercifolium*, Hk. et Grev.
- bbbb. —Fronds 1–2 inches long, pinnatifid or bipinnatifid.
13. *T. Krausii*, Hook. and Grev.
- aa. —Fronds entire or subentire; edged with peltate circular scales.
14. *T. membranaceum*, Linn.
- aaa. —Fronds entire or lobed; margin lined by a pellucid streak.
15. *T. muscoides*, Swartz.
- aaaa. —Sori in a copious lateral uniserial row; fronds pinnate (rarely entire or bipinnatifid) often proliferous and radicans.
- b. —Fertile fronds not contracted.
16. *T. Ankersii*, Baker
  17. *T. pinnatum*, Hedw.

- bb. —Fertile fronds contracted.  
 c. —Involucres free.  
     18. *T. botryoides*, Kaulf.  
     19. *T. spicatum*, Hedw.  
 cc. —Involucres immersed.  
     20. *T. elegans*, Rudge.  
     21. *T. heterophyllum*, H. B. K.  
 αααα. —Fronds lobed, pinnatifid or pinnatifid or pinnate.  
 b. —Fronds lobed.  
     22. *T. sinuosum*, Rich.  
 bb. —Fronds lobed or pinnatifid.  
     23. *T. pinnatifidum*, V. D. B.  
 bbb. —Fronds pinnatifid or pinnate.  
 c. —Segments entire.  
     24. *T. fastigiatum*, Sieb.  
     25. *T. crispum*, Linn.  
     26. *T. roraimense*, Jenm.  
 cc. —Segments dentate, lobed or pinnatifid.  
     27. *T. lucens*, Swartz.  
     28. *T. crinitum*, Swartz.  
     29. *T. Kaulfussii*, Hook. & Grev.  
     30. *T. alatum*, Swartz.  
     31. *T. Bancroftii*, Hook. & Grev.  
 bbbb. —Fronds bipinnatifid.  
     32. *T. macilentum*, V. D. B.  
     33. *T. superbum*, V. D. B.  
 ααααα. —Fronds multifid.  
 b. —Fronds small or of medium size.  
     34. *T. bicorne*, Hook.  
     35. *T. pyxidiferum*, Linn.  
     36. *T. tenerum*, Spreng.  
     37. *T. celluosum*, Sturm.  
     38. *T. trichoideum*, Swartz.  
 bb. —Fronds a span or more long.  
     39. *T. scandens*, Linn.  
     40. *T. radicans*, Swartz.  
     41. *T. rigidum*, Swartz.  
     42. *T. Prieurii*, Kunze.

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1. *T. setiferum*, Baker.—Fronds abundant, 1–4 li. l.,  $\frac{1}{2}$ –2 li. w., varying from ovate or ovate-orbicular to linear, tapering or rounded at the base and apex, striated, membranous and pellucid, ciliate edged, on dark filiform stipites a  $\frac{1}{4}$ –1 li. l.; veins fine, close, forked, with or without spurious venules; midrib more or less distinct to the apex, where in the fertile fronds it terminates in the solitary sorus; involucres immersed to the neck, the lips rounded and dark edged, the receptacles included or sometimes exerted.—*Jour. Bot.*, 1881, p. 52.

Jamaica, rare on wet rocks in forests at 5,000–6,000 ft. altitude. Both the sterile and fertile fronds vary a good deal in form, passing from broadly ovate (ovate-orbicular) to linear. The venation is very fine and close, giving the surface a striated aspect. Indistinguishable from the Indian and Ceylon *T. exiguum*, Baker (*Hymenophyllum*, Beddome).

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2. *T. pinnatinerva*, Jenm.—Rootstock thread-like, free-creeping, dark, tomentose; fronds abundant, 2–3 $\frac{1}{2}$  li. l., 1 $\frac{1}{2}$ –2 $\frac{1}{2}$  li. w., passing from ovate to ovate-oblong in form, with rounded apex and base, or the latter often more or less cordate; firm but thin, reticulated and pellucid, bright green, base on the underside dark, tomentose on rib and veins, as is also the slender stipe, which is a  $\frac{1}{4}$ –1 li. l.; margin plain, set with a few sharp, up-curved, usually simple hairs, chiefly along the upper part; veins pinnate, open, erecto-spreading, simple, or the lower ones occasionally forked from the base; midrib con-

tinuous to the apex, bearing a solitary terminal sorus in the fertile fronds; involucre pellucid like the rest of the frond, immersed to the rather large, expanded rim; receptacle included or sometimes exerted.—Gard. Chron., 1886, 2, 787.

Trinidad and Guiana, common in moist forests on the stems of saplings usually, over a wide area; well distinguished from any of the typical members of the *Hemiphlebiium* group by the simple, open, venation and by the involucre expanding at the top into a distinct rim rather than lips, though the rim is not, or only rarely is, quite circular, being more or less constricted laterally where united to the frond, and thus becoming sub-bi-labiate. Apparently quite identical with *T. Wallii*, Thw., Ceylon.

3. *T. solitarum*, Jenm.—Rootstock thread-like, freely repent, sinuated, tomentose, and much branched; fronds dark, dull green, abundant, scattered; stipites 1–1½ line long, rusty like the rootstock; blade finely striated, 3 or 4 lines long, 1–4 lines wide, the base cuneate, or subcordate, barren ones lanceolate or suborbicular entire, indented or sometimes cleft; fertile, often bat-like, the sides spreading and incised, deeply cleft and open at the top, with 1–4 stipitate, entirely free sori in the cleft, sunk within or much protruded; midrib evanescent above the base, veins fine, close, flabellate, forked; involucre unshaped, with rounded club-like lips.—Gard. Chron., Nov. 17, 1894.

Jamaica and Grenada.—The barren fronds of this might easily be taken for those of *T. setiferum* or *T. apodum*, the species being of like small size, but the fertile fronds of each are quite different, many in this resembling a pair of spreading incised wings, with the free sorus extended or not, neck and head—as of a water-bird when flying—in the deep cleft between. Occasionally a fertile frond is linear.

4. *T. labiatum*, Jenm.—Rootstock thread-like, free-creeping, dark, dirty, tomentose; fronds numerous, scattered, entire, varying from linear-lanceolate to orbicular in shape, sessile or shortly stipitate, 1–3 li. l., as much or more, usually less, broad, cuneate, rounded or cordate at the base, the apex similar, or casually with the projected involucre somewhat digitate, dark green, margin generally uneven, at first ciliate with stellate hairs but soon becoming bare, surface slightly striated; veins very fine and close, forked, radial from the centre, false venules obscure if present; sori 1–4 or 5 at the upper part of the frond; involucre tubular, free or the base margined or slightly sunk, lips rounded and dark edged; receptacle exerted or not.—Gard. Chron., vol. 24, p. 7.

Guiana, in forests, on stems of saplings and trees. This is one of the smallest species, but exceedingly variable in the shape of the frond and number of the sori. When the involucre are two or more they are divergent, and when the maximum number are present they spread somewhat digitately, and the fronds are oblong or broadest at the top. The lips at maturity spread and are prominent. With the duplication of the sori the veins form as many primary divisions. They are very close and spread flabellately.

5. *T. fruticosum*, Jenm.—Rootstock filiform, wiry, free-creeping, clothed with blackish tomentum, fronds plentiful, forming large wide-spreading patches, firm and strict in texture, dark green, faintly striated, the margin deciduously stellato-ciliate, sub-orbicular or more often broader than deep in outline, 2–4 li. each way, the outer edge more or less uneven, or incised between the sori, the base rounded, cuneate or partially or entirely cordate, passing into the filiform stiffish stipites which vary from ½–3 li. l., and are clothed at the base or throughout like the rootstock; veins very fine and close, radiating from the merely rudimentary mid-rib; sori 1–12, the involucre tubular, placed side by side along the broad outer margin,

free, or partially or fully immersed, the lips rounded and dark-edged, the receptacles usually included.—Gard. Chron., p. 71, Jan. 20th, 1894.

British Guiana; found on lime-walls of old Dutch forts in forests and on the trunks of trees; intermediate between *sphenoides* and *punctatum*. A rather stiff, wiry plant, the fronds generally broader than deep, rather angular, and reminding one of a grid-iron in shape. The sori are placed along the outer edge, one only in the smallest fronds, but varying to as many as a dozen in the largest ones. They are regular and uniform in line, and when there are several their series order gives to the little fronds of this species a very distinct and characteristic aspect.

6. *T. punctatum*, Poir.—Fronds imbricating or scattered, more or less orbicular, or ovate-oblong; cordate and sessile or nearly so, or rounded or cuneate and petiolate;  $\frac{1}{4}$ – $\frac{1}{2}$  in. b. each way; membranous, finely striated, bright green; the margin decidedly stellate-ciliate and even or somewhat uneven or broken into partial lobes; veins close, flabellate, no distinct midrib above the base; involucre immersed or partially or quite free; the lips distinct and rounded.—Hook. and Grev. Icon. Fil., t. 236.

On rocks or trees in damp forests up to 2,000 feet alt. The species is best distinguished from those near it by the more orbicular form of the fronds, shorter stipe generally, clearer green, brighter colour and thinner texture. The involucre are very variable in the degree of their immersion or projection; in the same frond presenting frequently the entire passage from full immersion to quite free, side by side. West Indies generally to Guiana, Brazil and Peru.

7. *T. apodum*, Hook. and Grev.—Fronds scattered,  $\frac{1}{4}$ – $\frac{1}{2}$  in. each way, orbicular or oblong, the outline lobate, the base cordate, stipites  $\frac{1}{4}$ – $\frac{1}{2}$  in. l.; midrib distinct; veins close, spreading, branched, with false venules between, surface striated, and with a few scattered deciduous minute ciliae over it; margin uneven, stellate-ciliate at intervals; sori on the outer part; involucre more or less exserted; lips of the mouth distinctly rounded.—Hook. and Grev. Icon. Fil., t. 117.

Jamaica to Barbados and Trinidad. This appears to be a rare species in Jamaica, where it was discovered by Swartz, but has not, apparently, been re-gathered by any collector since. The above description is taken from his specimens in the British Museum Herbarium. The Barbados plant is like a minute oak leaf, with broad rounded lobes and a free single sort, terminal on the excurrent midrib. The species seems to have been not distinguished by Swartz from *muscoides* and *sphenoides* as to which see Grisebach's Fl. B. W. Indies, p. 657, where the identity and synonymy are discussed.

8. *T. sphenoides*, Kze.—Fronds numerous, firm, membranous, striated, margins decidedly stellato-ciliate, bright or dark cloudy green;  $\frac{1}{4}$ – $\frac{3}{4}$  or 1 in l.,  $\frac{1}{4}$ – $\frac{1}{3}$  in w., ovate, obovate, oblong, orbicular or heteromorphic in outline, entire or more or less deeply and freely split into segments (sometimes between each pair of veins), or with projecting, irregular or regular spreading lobes, the base long-tapering, cuneate rounded or rarely cordate, quite sessile or with stipites varying in length to as much as  $\frac{1}{2}$  or  $\frac{3}{4}$  of an in.; veins repeatedly forked, and spreading from the rudimentary mid-rib at the base; sori 1–12, around the outer margin, variously inserted, the tubes of some free or, in cases, projected, others partially or quite immersed; lips rounded.—*T. lincolatum*, Hook., *Didymoglossum laceratum*.—Fée Fil. Ant., t. 32, f. 1.

General at low elevations in forests on rocks and trees and the banks of rivers. A very variable species, passing from orbicular and entire through varying degrees of cutting and form to the most heteromorphic state. The best character to recognise the species by, variable as it is, is the splitting of the fronds, a feature which may always be observed in some degree in all the states, chiefly in the barren fronds, which are often torn to the centre into mere shreds.—West Indies generally and Guiana to Brazil and Peru.

9. *T. pusillum*, Swartz.—Fronds plentiful, heteromorphic, oblong, linear, furcate with projecting and divergent linear lobes at the top or more or less fiddle-shaped or pinnatifid, 2–8 or 12 li. l., 1–6 li. w., very thin, cloudy green, the margins freely stellato-ciliate, the base rounded, cordate, cuneate, or much tapering, sessile or shortly stipitate; venation varying with the shape of the frond—the simple ones usually with a mid-rib reaching to the top, the others with primary branches extending into the projections, with or without intercalated, spurious disconnected branches; sori single in the simple fronds, or one to each lobe in the branched, the tube of the involucre more or less immersed; the lips rounded and dark-edged.—*Didymoglossum angustifrons*, Fée Fil. Ant., t. 28, f. 5.

Abundant on trees and rocks in damp forests at low altitudes. This presents greater variety of form than any of its allies, and the broader and narrower states might well, looked at apart, be taken for distinct species, but they both, and all the intermediate states, grow mingled together, and any extensive set of specimen will show them, repeatedly, on the same rootstock. On referring to Swartz's type specimens and his original description, in the British Museum, I found that this and *T. reptans*, Swartz, had been transposed in Herbaria and books. They are here employed as he used them. General throughout Tropical America.

10. *T. Fraseri*, Jenm.—Rootstock freely repent, criniferous, the blackish vestiture ascending but not reaching to the top of the paced petioles, which are a  $\frac{1}{4}$  in. l., fronds erect, pale green, pellucid, thinly membranous, glossy, naked, but sparsely setiferous in the axils and on the margins when young, oblong, oval or square, sub-flabellate, truncate,  $\frac{1}{4}$  in. l. and w., irregularly lobed or more or less freely pinnatifid; midrib distinct to the top; veins conspicuous and uniformly branched and ramifying in the obtuse lobes; sori confined to the top lobes, 1–6 in number, involucre translucent, urnshaped with closed, rounded lips at first, which are at length open, forming a nearly circular rim, base cuneate, not quite free; receptacles included or exerted.—Gard. Chron., p. 266, 1896.

Grenada, West Indies, collected by Mr. P. Neill Fraser. In form of fronds its nearest alliance appears to be with *T. parvulum*, Poir, and *T. proliferum*, Blume, both eastern species. Of American species its nearest relationship is with *T. quercifolium*, Hook, and Grev.

11. *T. reptans*, Swartz.—Stipites winged above, varying from hardly any to  $\frac{3}{4}$  in. l.; fronds plentiful, irregular in outline, oblong, lanceolate-oblong, or linear-oblong, rarely linear, sinuate, lobed, or pinnatifid to the broad wing of the mid-rib,  $\frac{1}{2}$ –2 in. l.,  $\frac{1}{8}$ th– $\frac{3}{4}$ ths in. w. the apex generally abrupt or truncate, or in the narrower fronds rounded or blunt, the base long-tapering or cuneate, thin and translucent, pale green, glabrous or glabrescent, except on the margins which are stellato-ciliate especially in the axils; lobes variable in the same frond, the largest 2–6 li. l., 1–2 li. w., entire, sinuate or serrulate; veins evident, open, simple in the smaller, and pinnate in the larger lobes, evanescent at the margin; false venules varying from many to hardly any; the mid-rib distinct to the top; sori few or several, on the outer or terminal lobes of the frond; involucre tubular, free or more or less immersed, generally the former; lips conspicuous, rounded.

Common in damp forests on rocks at high altitudes. A highly variable species in form and cutting, though at the same time well individualised and distinct. The colour is pale, rather a yellowish-green. Cuba and Jamaica to Trinidad and Guiana.



12. *T. quercifolium*, Hook. and Grev.—Rootstock thread-like, dark, criniferous; stipites  $\frac{1}{2}$ –1 in. l., similarly clothed; fronds oblong, pinnatifid,  $\frac{1}{2}$ –2 in. l.,  $\frac{1}{4}$ – $\frac{3}{4}$  in. w., reduced at the base, the apex more or less truncate or abrupt; thin, translucent, yellowish-green, naked or slightly ciliate, deeply cut to the broadly winged slender vein-like midrib into irregular lobes 1–6 li. l., 1–2 li. w., which are obtuse, crenate or again cut into irregular segments; veins wavy, one to each lobe or tooth, with or without false streaks between; sori chiefly confined to the apex of the frond; involucre winged, contracted at the neck, the lips at first closed, then expanded into a rounded recurved rim; receptacles rarely exerted.—Hook. and Grev., Icon. Fil., t. 115. *Didymoglossum fructuosum*, Fée, Fil. Ant., t. 28, f. 3.

Frequent in damp forests, on rocks and trees, usually at high elevations. Intermediate between *reptans* and *Krausii*. General throughout Tropical America.

13. *T. Krausii*, Hook. and Grev.—Stipites  $\frac{1}{4}$ – $\frac{3}{4}$  in. l., slightly margined at the top; fronds oblong or lanceolate-oblong, 1–1 $\frac{1}{2}$  or 2 in. l.,  $\frac{1}{3}$ –1 in. w., both base and apex not much narrowed, glabrous or glabrescent, membranous, light or dark green; deeply and regularly pinnatifid to the winged rachis, or bipinnatifid; pinnae spreading, copious,  $\frac{1}{4}$ – $\frac{1}{2}$  in. l., 1–2 or 3 li. w., toothed, sinuate or pinnatifid, plain or undulate-repand, the point rounded or acute, stellate-ciliate in the axils and dentations; veins simple in the lobes, false venules few or none; sori terminal, chiefly on the lobes of the upper part of the fronds; involucre margined or immersed at the base, but the greater part of the tube free; the lips rounded and conspicuous.—Hook. and Grev. Icon. Fil., t. 149. *Hemiphlebium pinnatifidum*, V.D.B.

Common on rocks and trees in forests at low elevations, forming large spreading patches. The most compound of all the species of *Hemiphlebium*, and readily recognised by its larger size, regular pinnation and linear or multifid cutting. Cuba to Brazil and and Peru.

14. *T. membranaceum*, Linn.—Fronds scattered on the rootstock, but overlapping in growth, sessile or shortly stipitate, variable and diverse in form, cordate-orbicular, irregularly-oblong, wedge-shaped or sub-flabellate, or, more rarely, more or less linear, 1–2 in. deep or more, from less than a line to 1–2 in. w., dark green, glabrous, firm, membranous, entire or variously broken, jagged or, in the narrower fronds, deeply incised, not ciliate, but fringed with minute circular peltate membranous scales, veins fine, very close, repeatedly dichotomously forked, spreading flabellately from the base-centre, with a few false venules between in some cases; sori along the outer margin; involucre more or less immersed; the mouth shallowly two-lipped, or the lips obsolete.—Pl. Fil., t. 101. Hook. Exot. Flora, t. 76.

Very common on wet rocks and banks by rivers or streams up to 3,000 ft. altitude, spreading and forming large patches. The curious fringe of peltate scales in the barren orbicular fronds is continuous; in the other forms they are paced at slight intervals. They lie flat with the plane of the leaf, and show on both its surfaces. In the narrower fronds, which are generally more or less digitate-pinnatifid, at the top the veins, crowded together up the centre, form a kind of spurious mid-rib; but in the broader ones they radiate from the base. The former are often devoid of marginal scales. The involucre are few or several; sometimes crowded together. The surface is distinctly striated.—West Indies generally to Guiana, Brazil and Peru.

15. *T. muscoides*, Swartz.—Fronds sessile or shortly petiolate, scattered,  $\frac{1}{2}$ –1 $\frac{1}{2}$  in. l., 2–6 li. w., variable, oblong, ovate, lanceolate or linear-lanceolate, long-tapering or cuneate at the base; the apex

rounded, lobed or tapering and obtuse, the sides sinuate-repand or more or less deeply lobed, thin and translucent; veins pinnate, open and few, erecto-spreading and branched, connected by a marginal lucent streak, with spurious venules between which are often free at the base; mid-rib slender faint or evanescent at the top; sori confined to the lobes of the outer part of the fronds; involucre immersed to the mouth, which is much expanded and indistinctly two-lipped; receptacles exserted or not.—Hook. and Grev., Icon. Fil., t. 179.

*a.* Var. *major*.—Fronds 2–3 in. l.,  $\frac{1}{4}$ – $\frac{3}{4}$  in. w., with broadly rounded lobes along the sides, plain and tapering at the base to a petiole  $\frac{1}{2}$ –1 in. l., very pale green, thin and translucent, involucre usually one in the centre of each lobe.

*b.* Var. *cordifolium*.—Fronds orbicular cordate, rarely ovate or oblong and rounded or cuneate at the base,  $\frac{1}{4}$ – $\frac{3}{4}$  in. diameter, mostly entire. *Didymoglossum*, Fée Fil. Ant., t. 28, f. 4.

*c.* Var. *minor*.—Fronds lanceolate, oblong, or ovate, 1–3 or 4 li. l., entire, with a single terminal sorus.

Very common at low elevations, growing on trees and rocks in forests and along the banks of rivers. *a.* Is a beautiful thin, translucent, pale green variety, much the largest of all that grows on the stems of *Cyathea elegans* in Jamaica, and resembles a good deal its near ally, which grows too on the same trees there, *T. sinuosum*, Rich. *b.* Is the most common. Trinidad and Guiana representative of the species, exceedingly abundant, covering the trunks of the troolie palm (*Manicaria saccifera*), and other trees. *c.* Is a minute plant, uniform in size, resembling *T. exiguum*, in form and dimensions, infrequent in Guiana forests, forming, like *cordifolium*, very large patches where found. Abundant throughout Tropical America, and widely dispersed in Africa, Asia and Polynesia.

16. *T. Ankersii*, Parker.—Rootstock wiry or thread-like, wide-creeping, simple or occasionally branched, but not interlaced, eventually naked; fronds scattered alternately along its axis, on stipites hardly  $\frac{1}{4}$  in. l., 3–12 in. l., broadest at the base, where they are from 1–2 $\frac{1}{2}$  inches wide, and tapering gradually outwards, or uniform in width throughout, deeply pinnatifid to the winged costæ; pinnae rather irregular, linear-oblong, even-edged, or bluntly toothed, rounded at the apex,  $\frac{1}{2}$  to over 1 in. l., 1–2 $\frac{1}{2}$  li. w.; thin, translucent; naked; veins close, oblique, simple, terminating within the edge or teeth; sori confined to the sides, usually to the lower part of the pinnae; involucre tubular, pedicellate, with a narrowly expanded rim; receptacles exserted.—Hook and Grev. Icon. Fil., t. 201.

Var. *T. brachypus*, Kze.—Pinnae deeply pinnatifid forming narrow linear segments, simple or forked; the costæ and costulae alike winged.—Hook and Grev. Icon. Fil., t. 218., *T. acostea*, V.D.B.

Very common in forests, growing up the stems and trunks of trees and the perpendicular sides of rocks. The wire-like rhizomes grow up in parallel lines, and the fronds spread right and left, horizontally, flat on the surface, and adhere by a kind of rusty tomentum specially thrown out for the purpose along their rachises, thus tightly embracing the tree or roots. Often there is only one sorus to a pinna or lobe, placed in the axil of its superior base. The pedicels of the involucre are rather long, and the limb is often bent over. There is no doubt of the specific unity of the two extreme states. West Indies to Guiana and Brazil.

17. *T. pinnatum*, Hedw.—Stipites tufted on a shortly elongated rootstock, 2–8 in. l., narrowly margined upwards, fronds pinnate or pinnatifid, variable in size, and in the number of pinnae, 2–3 or 4 in. w., 3–6 in. l. or more, membranous, naked, the rachis and costæ slightly

scurfy or puberulous; pinnae finely serrated, 1-2 in. l.,  $\frac{1}{4}$ - $\frac{1}{3}$  in. w., spreading, upper ones decurrent at the base, free on the superior side, terminal pinnae like the lateral, or changed into a long naked radicate tail, lower ones quite free at the base, or adnate and connected by a narrow membrane; veins close, parallel, simple or forked, with or without spurious transverse venules; sori very copious along both margins, and descending the decurrent basal lobes; involucre small, free and stipitate, close, cylindrical; the mouth truncate or rather contracted or dentate, receptacles exerted.—Hook. and Grev. Icon., t. 9. *Neuromanes Hedwegii*, V. D. B.

a. Var. *T. floribundum*, H. B. K.—Fronds much larger; pinnae 6-9 in. l.,  $\frac{1}{2}$  in. or more w., with a similar long terminal one which, as in the type, is sometimes changed into a radicate, flagelliform tail.—*T. pennatum*, Klf. *Neuromanes Kaulfussii*, V. D. B.

b. Var. *T. vittaria*, D. C.—Barren fronds pinnate, prostrate, fertile entire, lance-shaped, erect 1-2 ft. l.,  $1\frac{1}{2}$  in. w.

This is one of the most heteromorphous of all the species in the genus. Several forms which run one into the other I include in the type. *a* is much larger, reaching a foot or more each way, with few linear ligulate pinnae. *b* is remarkable for its long, quite simple lance-shaped fertile fronds, while the barren fronds are identical with those of the preceding variety. In all the varieties the pinnae are more numerous in the barren than the fertile fronds, *b* being the extreme development of this tendency. Some have abundant transverse false venules between the veins, in others these are partially developed while others again are quite devoid of them. West Indies, Mexico, Guiana to Brazil and Peru.

18. *T. botryoides*, Kaulf.—Rootstock short, 1 line thick, clothed with dark hair-like scales; stipites caespitose, dark-ciliate,  $\frac{1}{4}$ - $\frac{1}{2}$  in. l. in the barren,  $1\frac{1}{2}$ -3 in. in the fertile; barren fronds 2-3 in. l., about 1 in. w., pinnatifid, prostrate, with, in most cases, a terminal thread-like, tail bearing buds at intervals along its axis; rachis very slightly winged; pinnae close, linear-oblong, blunt, serrated, 1- $1\frac{1}{2}$  li. w., more or less free at the base; surfaces naked, or slightly scaly on the slender rachis and veins; texture thinly membranous; veins close, forked, running into the marginal teeth; fertile fronds suberect,  $1\frac{1}{2}$ -3 in. l., 1- $1\frac{1}{2}$  li. w.; sori in a double row along the rachis, the involucre apart, stipitate, not connected by a leafy membrane, or only slightly in the upper third by a slight marginal wing which terminates in a leafy barren apex; receptacles exerted.—*T. nanum*, Bory.

Guiana.—This is the most delicate plant of the group, which character, the foliaceous apex of the fertile frond, sub-cordate base of the pinnae of the barren and lax sori, clearly distinguish it from its nearest ally, *T. spicatum*, Hedw. Found also in Panama by Seeman.

Ø. *T. spicatum*, Hedw.—Rootstock elongated, strong, slender, erect sterile fronds exterior, spreading, 3-6 in. l.,  $1\frac{1}{4}$ - $1\frac{1}{2}$  in. w., deep pinnatifid, dark green, naked or furfuraceous-scaly beneath, firm texture, on wiry sub-fibrillose stipites that are about 1 in. l.; pinnae spreading very close,  $\frac{3}{4}$ -1 in. l., 2 li. w., the margins entire or slightly crenate at the bluntly rounded end; veins very close, curved, branched and casually uniting; fertile fronds entire, hardly a  $\frac{1}{4}$  n. w., 2-5 in. l., with stipites 2-5 in. l.; involucre close, free

to the base, oblique, the mouth truncate, bi-dentate or eroded, no rim; receptacles exserted.—Hook, Gard. Ferns, t. 60. *Féea poly-podina*, Bury.

*T. spicatum*, Hedw., is figured in Rudge's *Plantarum Guianæ Rariorum*, mixed, by mistake, with *T. elegans*, which it very much resembles, but is distinguished by having the involucre quite free of connecting membrane, and at an oblique angle with the rachis. All the species of this section are terrestrial, and grow among stones and in the fissures of rocks, in moist forests, and on the banks of well-shaded rivers. West Indies generally to Panama, Guiana and Ecuador.

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20. *T. elegans*, Rudge.—Rootstock  $\frac{1}{6}$  in. thick, shortly erect or decumbent, densely clothed with dark, hair-like scales; stipites cæspitose, wiry, those of the barren fronds  $\frac{1}{2}$ – $1\frac{1}{2}$  in. l., fertile 3–5 in., clothed with a few scales like those of the rootstock; barren fronds 3–7 in. l.,  $1$ – $1\frac{1}{2}$  in. br., mostly reduced a little at the base, sometimes with a naked proliferous tail at the apex, prostrate or erecto-spreading, cut nearly to the costæ into close linear, blunt lobes which are  $1$ – $1\frac{1}{2}$  li. w.; veins conspicuous, close, oblique, forked, casually uniting and connected by the marginal line; surfaces naked; texture membranous; fertile fronds erect, 3–6 in. l., 2 li. w., formed of a double line of costal sori, the involucre sunk to their rims and connected by the narrow membrane; placed at right angles with the rachis; receptacles exserted. Hooker's Garden Ferns, table 9. *Hymenostachys diversifrons*, Bory. *Féea Boryi*, V.D.B.

Trinidad, common in moist ravines, Guiana, frequent. Rather a rigid little plant, of plumose habit, the barren fronds spreading all around, and the slender fertile ones erect in the centre. It differs from the preceding by the connected and immersed receptacles of the sori. From Panama to Peru and Brazil.

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21. *T. heterophyllum*, H. B. K.—Rootstock free, creeping, horizontal, thick as cord, densely rusty tomentose; stipites scattered, erect, rather flexuose,  $1\frac{1}{2}$ –3 in. l., slightly rusty tomentose; fronds erect, oblong-lanceolate, obtuse or rounded at the top,  $1\frac{1}{2}$ –4 in. l.,  $\frac{3}{4}$ – $1\frac{1}{4}$  in. w., deeply pinnatifid to the margined rachis; dark green, membranous, but firm, oblong, close, rounded at the end, crispate,  $\frac{1}{2}$ – $\frac{3}{4}$  in. l., 2–4 li. w.; veins repeatedly forked, surfaces slightly finely scaly, chiefly on the ribs; fertile fronds erect, 3–6 in. l.,  $\frac{1}{2}$  in. w., on petiole 7–10 in. l., pinnatifid, segments rounded, 2–3 li. w. & d., every vein fertile; sori surrounding the margin, involucre sunk to the hollow mouth; receptacles exserted.—*Féea Humboldtii*, V. D. B.

Guiana. The barren fronds are exactly like the shorter crispate states of *T. crispum*. The rootstock is about a line thick and densely rusty tomentose. The fertile fronds considerably over top the barren, are linear-ligulate, densely soriferous and margined with the long fringe of exserted receptacles. *T. Spruceana*, Hook. Icon. Pl., t. 21, is a variety with smaller less crisped barren fronds and broader fertile ones, in which the pinne are deeply incised, and the involucre separated and much smaller. The fertile frond is divided like the barren, only it is much narrower and runs up on a very long stalk.

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22. *T. sinuosum*, Rich.—Rootstock threadlike; stipites scattered, wiry,  $\frac{1}{2}$ –2 ins. long, winged upwards; fronds pendent, 3–9 ins. long,  $\frac{1}{2}$ –1 in. wide, thin, pellucid, pale green, slightly ciliate, cut down to the very broad wing of the rachis into short, angular-oblong lobes, which are  $1\frac{1}{2}$ –3 lines wide, with an open sinus between; veins ax,

pinnate, branches few, simple very oblique; sori 1-3 on the outer part of the slightly and obtusely dentate lobes; involucre immersed to the rim of the broadly dilated mouth; receptacles generally much exerted.—Hook. & Grev. Icon. Fil., t. 13, *T. incisum*, Kaulf.

Infrequent in moist forests, on the stems of trees and tree-ferns, at low or medium elevations. The fronds are finger shaped, and rather broadest near the base, from which they taper upwards very gradually to an obtuse or rather acuminate apex. Peculiar for its pale colour and thinly membranous texture through which the undulating veins show as a conspicuous feature. West Indies generally, Mexico and Guiana to Brazil and Peru.

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23. *T. pinnatifidum*, V.D.B.—Rootstock repent threadlike; stipites 1-2 ins. long, winged upwards, slender; fronds oblong, or oblong-lanceolate, 2-4 ins. long, 1-1½ in. broad, widest at or just above the base, pinnatifid; rachis slender, broadly winged; pinnae linear-oblong, erecto-spreading, contiguous, with an open, oblique sinus between them, ½-1 in. long, blunt; lobate-dentate on each side, as is the attenuated top of the fronds; very pale, thin, membranous and pellucid, slightly ciliate; veins pinnate, branches 4-6 on a side, rather distant; sori 1-3 to a pinna, situated on the superior side, subaxillary, or on the lobes of the top of the fronds; involucre immersed to the broadly dilated mouth.—Hook. and Baker, Syn. Fil., p. 78.

Jamaica, collected by March, whose specimens are in the Kew Herbarium, but which bear no specific locality. It very closely resembles the preceding in texture and colour, but in form is broader and more deeply lobed, and the sori are in, or near, the axils of the lobes of the pinnae or more terminal on the smaller lobes. Gathered also in Nicaragua.

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24. *T. fastigiatum*, Sieb.—Rootstock repent, clothed with rusty hair-like scales, stipites close together, strong, erect, short, coated, as is the rachis, with rusty or reddish hair; fronds 6-10 in. l., 1-1½ in. w., acuminate, and tapering from the middle gradually away to the base, pinnatifid above, but fully pinnate below, pinnae close or imbricating, spreading horizontally, crenate and much crisped, oblong, blunt, ¾ in. l., 2-3 li. w., the upper ones connected at the base, those below a little dilated and free there; densely coated with rufous hair, veins once or twice forked; sori confined to the ends of the pinnae, few, involucre immersed to the dentate mouth; receptacles exerted. *T. plumula*, Presl.—Hook & Grev. Icon. Fil., t. 12.

Probably not more than a variety of *crispum*, from which it differs by its very dense pilosity, and the pinnae dwindling almost to the base of the very short stipites where they are quite disconnected. West Indies, Venezuela and Guiana to Brazil.

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25. *T. crispum*, Linn.—Rootstock short, fasciculate, generally breaking into several divergent buds, sub-repent, densely dark-brown, tomentose, stipites spreading or suberect, 2-6 in. l., rusty-tomentose, not margined, fronds oblong-lanceolate, ½-1 ft. l., 1½-3 in. w, broadest near the base, more or less rusty villose, membranous, but firm and rather harsh in substance, pinnatifid almost or quite to the rachis, which is very slightly margined with membrane, pinnae oblong or linear-oblong, close or imbricating, horizontal, 1-1½ in. l., ¼-½ in. b., rounded at the end, the base fully adnate or partially or quite free on one or both sides, margins plain, crenulate or dentate-crenulate and crisped; veins repeatedly dichotomous; sori several, on the outer part

of the pinnae, usually only of the upper ones; involucre cylindrical, immersed, the mouth variable—not expanded and slightly bilabiate, or more dilated and the corners somewhat projecting; receptacles little or much exerted or not at all.—Pl. Fil., t. 86. Hook. & Grev. Icon. Fil., t. 12.

*a. Var. T. pellucens*, Kunze.—Rootstock free-creeping, not fasciculate, but simple, as thick as strong cord, the fronds paced thereon.

*b. Var. T. procerum*, Fée.—Rootstock slender, usually simple, quite erect, fronds stiffly erect, 1–1½ or 2 ft. l., tapering equally both upwards and downwards, the pinna in the lower part gradually more and more deflected.—Fée Fil. Ant., t. 28, f. 2.

Very common throughout Tropical America, one of the best marked of species, while one of the most variable. But though varying so much, under different circumstances in the same or in different countries, all the forms may be easily grouped under the three types above described. Also ascribed to West Tropical Africa.

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26. *T. roraimense*, Jenm., n. sp.—Rootstock repent, thick as stout cord, densely clothed with fine subulate castaneous scales; fronds 4–5 in. l., 1–1¼ in. w., pinnate, dark green, naked, most densely pellucid-dotted; petioles scattered, ¾–1¼ in. l.; rachis flattened, and narrowly winged above; pinnae numerous, near horizontal, oblong, rounded, the base cuneate, ½–¾ in. l., ¼ in. w., margins bidentate and slightly incised, teeth obtuse; veins prominent, forked, striating the surface, reaching the edge; sori confined to the upper half of the frond, one or two terminal on each pinnae, involucre large, two-horned, gaping widely; receptacles strong, conspicuously exerted.

Guiana—Mt. Roraima; a very characteristic species owing to its peculiar rootstock, large, wide-gaping involucre, and long projected filiform receptacles spread in serial order along the sides of the fronds. Gathered by Messrs. Fred. McConnell and J. J. Quelch in 1894, and purchased by me from their assistant, C. A. Lloyd. It has much the longest involucre of any species known to me.

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27. *T. lucens*, Swartz.—Rootstock short, erect, ¼–½ in. thick, with descending wiry roots, the top clothed with reddish, matted tomentum; stipites caespitose, clothed as the rootstock and shaggy, 1–2 in. l., not margined; fronds prostrate, ½–1½ ft. l., 1–2 in. w., acuminate, reduced at the base, fully pinnate; pellucid, membranous but flaccid; varying from a light to a dark green with age; villous, the rachis and ribs generally most densely reddish tomentose; pinnae numerous, spreading, curved, lower apart or not, upper close, often imbricating, ½–1¾ in. l., expanded, and a ¼–½ in. w. at the free, quite sessile base, acute, cut half way or more to the costæ into crispate lobes 1 li. w. and l., which are dentate-crenulate, crowded and crispate; veins pinnate in the lobes, with 1–2 simple branches on each side; sori copious along both margins of the pinnae, one to each lobe; involucre fully immersed, expanded from the base upwards to the mouth, which is transversely depressed, the corners projecting somewhat; receptacles usually much exerted.—Hedw. Fil., t. 5, Hook. Sp. Fil., vol. 1, t. 41. *a. T. splendidum*, V.D.B.

Jamaica, under the shelter of rocks and stumps, in forests of the higher slopes above 5,000 ft. alt., of the same habit of growth as *P. crinitum*, and inhabiting similar sheltered spots. Guatemala to Peru

28. *T. crinitum*, Swartz.—Rootstock erect, clothed with brown subulate scales; stipites cæspitose, spreading, very slender,  $\frac{1}{2}$  to over 1 in. l., slightly winged at the top, villose; fronds spreading or prostrate, 2–5 in. l.,  $\frac{1}{2}$ –1 in. w., the base not, or only casually, reduced, pinnatifid, or fully pinnate at the base; very thin; pale yellowish; freely ciliate; pinnae crowded and overlapping, the lower ones often apart, deeply and bluntly dentate, or the inferior pinnatifid, the latter more or less free at the base, quite sessile,  $\frac{1}{4}$ – $\frac{1}{2}$  in. l., 2–3 li. w., oblong, or the larger rhomboidal, blunt or truncate, repand, teeth or lobes few; veins pinnate, 2–4 branches on each side, simple, or the inner ones forked; rachis slender, narrowly winged upwards, rusty-villose; sori in a line along both margins of the fronds, 1–2 or 3 at the end of each pinna; involucre immersed to the expanded ciliate mouth; receptacles long exserted, with clavate apices, forming a fringe on each side of the fronds.—Hedw. Fil., t. Ragatelus, Presl.

Jamaica, St. Vincent, frequent at high and mean elevations growing in forests on decaying wood, generally under the shelter of old stumps. The fronds in which the pinnae are most crowded and overlap have, when pressed, a crimped or folded double-edged aspect where fertile. The extended receptacles are a peculiar feature, being from  $\frac{1}{4}$ – $\frac{3}{4}$  of an inch long. The pinnae are so crowded in some cases that the involucre appear side by side along the margins of the frond, as if it were entire. When fresh or growing, the fronds present a beautiful golden bronze hue under certain aspects of light. The St. Vincent plant differs slightly, and is *T. L'Hermineieri*, Fée. Fil. Ant., t. 29. fig. 1.—Andes of Ecuador.

29. *T. Kaulfussii*, Hook et Grev.—Rootstock free-creeping, strong, densely coated with bright brown subulate scales; stipites approximate, 2–4 in. l., erect, winged broadly upwards; fronds  $\frac{1}{2}$ –1 ft. l.,  $1\frac{1}{4}$ –2 in. w., membranous, pellucid and finely areolated; the rachis, especially above, densely rusty ciliate; pinnatifid to the broad wing of the rachis reduced or not at the base; pinnae close, spreading nearly horizontally, blunt or rounded, 1 in. l.,  $\frac{1}{4}$  in. w., dentate crenulate; veins pinnate, branches once or repeatedly forked; sori two to several, around the outer part of the pinnae; involucre immersed, mouth rather dilated, the corners projecting.—*T. lucens*, Hook. & Grev. Icon. Fil., t. 10.

Infrequent or rare in forests and coffee-fields growing on trees and decaying logs at mean and high altitudes. It resembles somewhat *T. crispum*, from which it is distinguished by its less deeply cut fronds, and decurrent wings of the stipites broadest in the upper part. The rachis and its wings together are about two lines broad. West Indies generally and Guiana to Brazil.

30. *T. alatum*, Swartz.—Rootstock shortly elongated, erect or sub-erect, rusty-villose, stipites cæspitose, several, very slender, 1–2 in. l., usually freely ciliate, free or slightly margined at the top; fronds erect or erecto-spreading, oblong or more often lanceolate-acuminate, thin; more or less ciliate throughout; 2–5 in. l.  $\frac{3}{4}$ – over  $1\frac{1}{2}$  in. w., the base truncate, the apex often attenuated, generally bi-pinnatifid, pinnae spreading, approximate but rather lax, 2–4 l. w.  $\frac{1}{2}$ –1 in. l., sessile, the lower half lobed or pinnatifid, the outer usually attenuated and dentate; ultimate lobes dentate, 1 li. w., 1–2 li. l.; rachis slender, winged throughout; veins rather undulate, branched in the lobes; sori one to each lobe along the sides of the pinnae and of the often attenuated upper part of the frond; involucre immersed to the widely dilated mouth, which is deeply depressed transversely, receptacles more or less exserted.—Pl. Fil. t. 50 D. Hook. & Grev. Icon. Fil. t. 21. *T. attenuatum*, Hook. Sp. Fil. Vol. 1. t. 39 c.

a. Var. *radiculatum*, Jenm.—Rootstock creeping, cord-thick; stipites scattered, strong; fronds 6–10 in. l. 2–3 in. b., very acuminate; lower pinnae sub-distant, pinnatifid; rachis barely winged at the base.

b. Var. *ptilodes*, V. D. B.—Rootstock creeping erect; stipites caespitose, 6–8 in. l., fronds 10–12 in. l. 3–6 in. br.; pinnae pinnatifid, 2 in. l.  $\frac{1}{2}$ – $\frac{3}{4}$  in. w. lobes toothed, texture delicate; rachis winged.—Hook. & Grev. Icon. Fil. t. 11.

Very common in damp forests at high altitudes on the trunk of trees. Very variable in size and habit of growth but not to be mistaken in any of its forms. The sides of the involucre are raised by their attachment to the frond, showing generally a deep transverse depression, including the stipites. *T. attenuatum*, Hook is often 18 in. l., very membranous and delicate. *P. ptilodes* V.B.D. I have only seen from Trinidad.—West Indies generally and from Columbia to Brazil.

31. *T. Bancroftii*, Hook and Grev.—Rootstock short, erect, coated with minute dark-brown subulate scales; stipites several, caespitose, erect, 1–2 in. l., broadly winged from the base upwards; fronds erect, oblong, 1–2 $\frac{1}{2}$  or 3 in. l.,  $\frac{1}{2}$ – $\frac{3}{4}$  in. w., the base truncate, the apex rounded, pinnatifid to the broad wing of the rachis, firm, dark-green, glabrous and rather glossy; pinnae close, or overlapping, or the lower ones a little apart, spreading, oblong, 2–3 li. w.,  $\frac{1}{3}$  in. l., the end rounded, and with the sides bluntly dentate, and undulate-repand; veins pinnate, branches lax, 2–4 to each side, simple or forked; sori 1–5 to a pinna, around the outer margin; involucre immersed to the expanded rim; receptacles long-exserted.—Hook and Grev. Icon. Fil. t. 204. Hook. Gard. Ferns, t. 56.

Common in forests, growing chiefly on decaying logs and rocks at altitudes up to 4,000 ft. The fronds and petioles are nearly an equal length; the margins particularly full and repand generally. Gregarious, and in places forming considerable masses, but the plants grow in separate tufts, standing erect. It varies much in size, and some of the plants from the higher altitudes are only an inch or an inch and-a-half high.—West Indies generally to Guiana, Brazil and Peru.

32. *T. macilentum*, V.D.B.—Rootstock rather slender and wiry, often several inches long, but with fronds only at the growing end, which is clothed with dark-coloured minute paleæ; stipites apart on its axis, or, as often, rather closely clustered together, 1–3 in. l., winged nearly to the base; fronds ovate, or ovate-oblong, 1–4 in. l., 1–2 $\frac{1}{2}$  in. w., broadest at the base, bi-pinnatifid, membranous, dark green; rachises winged like the stipites; pinnae spreading  $\frac{1}{2}$ –1 $\frac{1}{4}$  in. l.,  $\frac{1}{4}$ – $\frac{1}{2}$  in. w. cut deeply to the winged costæ into linear, simple or forked segments, which are blunt,  $\frac{1}{2}$  li. w. and 2–3 li. l. veins simple in the lobes; surfaces very slightly and minutely scaly on the ribs rachis and petiole; sori usually confined to the outer lobes of the pinnae; involucre small, immersed to the dentate mouth; receptacles long-exserted.

Trinidad; Guiana; marked from *Bancroftii*, its nearest and very close ally, by the rather free-creeping root-stock and broader, bi-pinnatifid fronds. Though the root-stock extends freely, the fronds grow in an oblique plane with it, and appear more or less tufted at the end. This is merely a modification of the caespitose habit, greatly favouring however the prolongation of the individual life, and, thus, also, the perpetuity of the particular type.

33. *T. superbum*, V. D. B.—Rootstock about a line thick, strong, creeping, clothed with dark subulate scales; stipites apart, erect, 2 $\frac{1}{2}$ –5 in. l., lined on each side with a broad crispate wing; frond



lanceolate-acuminate, 4-9 in. l., 1-4 in. w., deeply cut down to the broadly winged rachis into spreading toothed or pinnatifid pinnæ, which are  $\frac{1}{2}$ -2 in. l., 2-6 li. w., rounded at the ends; lobes  $\frac{1}{2}$ -1 li. w.; obtuse; veins forked or pinnate in the lobes; texture membranous but firm; stipites rachises and ribs rusty-ciliate, as is likewise the margin in a young stage; wings of the rachis undulate; sori one to each lobe, at the end of the pinnæ or along both sides; involucre very small, the slightly contracted mouth dentate, the limb immersed or more usually nearly or quite free.

Trinidad; Guiana; a much larger plant than either *Bancroftii* or *macilentum* and well marked by the broad crispate wings of the stipites and rachises, the acuminate fronds, more plentiful vestiture, and mostly quite free involucre.

34. *T. bicornis*, Hook.—Rootstock strong, with abundant fibrous rusty-tomentose roots, about a line thick, shortly elongating, hardly erect or decumbent, clothed with dark minute scales; stipites numerous, tufted or slightly apart on the rootstock, 1-2 inches long, winged to the base, often flexuose; fronds broadly ovate, broadest at the base,  $1\frac{1}{2}$ -2 in. l.,  $1\frac{1}{2}$  broad, tri-quadri-pinnatifid, all the parts rather crowded and divaricately spreading; membranous, pale pellucid green; stipites rachises and ribs minutely scaly; wings of the rachis, pinnæ and pinnulæ undulate-crispate; ultimate segments linear, hardly a  $\frac{1}{4}$  li. w.; undulate and slightly shrivelled when dry, a single veinlet to each, which hardly reaches the apex; involucre immersed, with a pair of spreading winged horns; receptacles exerted.—Hook. Ic. Pl. t. 982.

Guiana; among stones in damp forests of elevated regions; an exceedingly beautiful little plant, growing in dense tufts, with much cut glistening translucent fronds. The very peculiar lateral projections curving from the deep mouthed involucre most distinctly mark it.

35. *T. pyxidiferum*, L.—Rootstock thread-like, wiry, stipites scattered, slender,  $\frac{1}{2}$ -2 in. l., slightly margined above; fronds very variable in size and shape, from  $\frac{1}{2}$ -4 in. l.,  $\frac{1}{4}$ -2 in. w., membranous, glabrous and rather glossy, pellucid, varying from pale to dark green, tri-quadri-pinnatifid, the base truncate or reduced, the apex acuminate; pinnæ spreading, approximating in form to that of the frond, variable in size, freely decompound, or composed of few segments, the ribs margined with membrane as is the rachis; ultimate segments linear the free part about a  $\frac{1}{4}$  li. w.,  $\frac{1}{2}$ - $1\frac{1}{2}$  li. l., retuse or not; sori on suppressed lobes, in the axils of the pinnæ or pinnulæ, most often forming a single, or partially double, row on each side of the rachis in the upper part of the fronds; tube of the involucre cylindrical, free but narrowly winged with membrane, with a broad expanded, sometimes free, rim to the mouth; receptacles often much exerted. Pl. Fil. t. 50 E.—Hook. & Grev. Icon. Fil. t. 206. *T. brasiliensis*, Desv.

Very abundant in moist forests growing in patches on rocks and the trunk of trees and tree ferns. A highly variable species, the forms being polymorphic, but easily recognised under their widest range. Some of the larger and more delicately cut varieties run almost into the next species. Throughout the West Indies and Tropical American mainland, and widely spread also in the Eastern and Southern Hemispheres.

36. *T. tenerum*, Spreng.—Rootstock thread-like; stipites slender,  $\frac{1}{2}$ -1 in. l.; fronds scattered, pendent 2-6 in. l.,  $\frac{1}{2}$ - $1\frac{1}{2}$  or 2 in. b., very delicate and flaccid in nature, bi-tri-pinnate, variable and irregular in

outline, reduced at the base, pale straw-green; rachis filiform, margined at the apex; pinnæ spreading-pendent,  $\frac{1}{2}$ -2 in. l.,  $\frac{1}{3}$  in. or less w., lax; the inferior pinnulæ pinnate, passing outwards into forked, thin simple segments; basal pinnæ greatly reduced and distant, flabellate and only 1-2 li. each way; ultimate segments distant very narrow  $\frac{1}{4}$ - $\frac{1}{6}$  of a l. w., 1-2 li. l., retuse; sori sparse, usually confined to the outer inferior lobe of the axillary pinnulæ; involucre winged, outer wing broader often; rim of the mouth expanded, the hair-like receptacles long exserted.—*T. angustatum*, Carm. Hook and Grev. Icon. t. 166.

Jamaica, rare in forests on the stems of tree-ferns at about 6,000 ft. altitude. It is intermediate between *cellulosum* and *pyxidiferum*. The habit is very loose and pendant, the texture exceedingly delicate and membranaceous; and the pinnæ in the larger fronds somewhat irregularly extends, and hang with the line of the rachis.—Mexico southward to Brazil and Peru.

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37. *T. cellulosum*, Sturm.—Rootstock strong, 1 line thick, shortly elongated, erect or sub-erect, clothed with minute dark subulate scales above; stipites numerous, tufted or a little apart, wiry, slightly margined above, 1-2 in. l.; fronds 2-2 $\frac{3}{4}$  in. l. about 1 in. w., rather plumose lanceolate, quadri-pinnatifid, all the parts filiform and rather wiry but the ultimate divaricating segments, which are about an  $\frac{1}{8}$ th li. w.; rachis and ribs throughout very slightly margined; parenchyma cellulose, forming a microscopical net-work of meshes; involucre minute, terminal on the segments, with faint lateral margins like those of the ribs, the mouth truncate and contracted; receptacles slightly exserted; texture stiff, surfaces naked.—Hook. 2nd. cent. Ferns, t. 63. *T. geminatum*, J. Smith.

A stiffish plant, filiform in all its parts except the little baton shaped ultimate segments. The network of transparent cells, which a lens reveals in the narrow pagina is most beautiful and unmistakably marks it. This and *bicornis* have the same habit of growth.—Venezuela to Brazil.

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38. *T. trichoideum*, Swartz.—Rootstock thread-like; stipites very slender, channelled, not margined, 1-1 $\frac{1}{2}$  in. l.; fronds lanceolate or oblong-lanceolate, tri-quadripinnate, reduced at the base, very stiffish, dark green, naked, 3-5 in. l.  $\frac{1}{2}$ -1 $\frac{3}{4}$  in. w.; pinnæ spreading, lax or approximate, 2-6 li. w.  $\frac{1}{2}$ -1 in. l. bi-tripinnate; pinnulæ pinnate or forked, spreading; ultimate segments divaricating, emarginate or bifid, filamentose,  $\frac{1}{6}$ th- $\frac{1}{8}$ th of a li. w. or less,  $\frac{1}{2}$ -1 li. l.; rachis and costæ devoid of any marginal membrane, which is only found on the ultimate parts; sori occupying the inferior lobes of the pinnæ and pinnulæ, usually sparse; involucre stipitate not margined laterally, the mouth expanded into a broadish rim; receptacles exserted.—Pl. Fil. t. 99 D. Hook. & Grev. Icon. Fil. t. 199. *T. capillaceum*, Linn.

Jamaica, most plentiful in forests growing on the trunks of tree-ferns above 5000 ft. altitude. This is the finest cut species of all, having no membrane at all except to the very slender ultimate division, the lobes of which have, from this and their emarginate character, a slightly flattened appearance. The slender rachis is rather stiffish, a little flexuose, and channelled down the face. The living fronds are plumose in habit generally, but vary in this character, some being densely so. The involucre are usually only one or two to a pinnæ, more often the former. On the higher slopes of the Blue Mountain Range this plant forms a most beautiful feature in the forest vegetation, being almost exclusively confined to the trunks of *Cyathea pubescens*, which in sheltered places it clothes densely from ten to fifteen feet upwards from the ground with a mantle of glistening sheen, dripping as all the parts of the fronds nearly always are, with dew drops.—St. Domingo, Mexico, Ecuador and Brazil.

39. *T. scandens*, L.—Rootstock free-creeping, as thick as stout cord, strong, densely reddish-villose; stipites scattered, 2-4 in. l., strong, decidedly rusty-scaly becoming quite bare; fronds sub-pendent, 6-15 in. l., 3-8 in. w., ovate-lanceolate and acuminate, truncate at the base, tri-quadri-pinnate, membranous, a bright silky-looking golden green, more or less rusty-villose; rachis strong, at first densely villose, free of membrane except at the top; pinnæ the same shape as the fronds, spreading, acuminate, from 1 over 2 in. w., 2-4 in. l.; costæ winged, or those of the lower pinnæ not; pinnulæ  $\frac{3}{4}$ - $1\frac{1}{4}$  in. l., 2-8 li. w., pinnatifid to the narrowly winged costulæ; their segments oblong, about 1 li. w. and 2-4 or 6 li. l., serrato-lobate on both sides; veins forked in the lobes, simple in the teeth; sori very abundant, often occupying nearly all the teeth of the ultimate divisions, or at least the inferior ones; involucre immersed and winged to the expanded rim, receptacles generally exserted.—St. t. 58 *T. macroclados*, Kze. *T. Lindenii*, Presl.

Jamaica, most abundant in the forests of the lower mountains from 1,000-2,000 ft. elevation, but extending upwards, though much rarer, to 6,000 ft. This fine species is most likely intended in Plum. Fil. t. 93, the fronds being there represented as pinnæ. The stems creep freely vertically on the trunks they occupy, several feet high from the ground.—Cuba, Hayti and Mexico.

40. *T. radicans*, Swartz.—Rootstock free-creeping, strong, thick as cord, blackish or rusty-tomentose, fronds scattered alternately on the rootstock,  $\frac{1}{2}$ - $1\frac{1}{4}$  ft. l. 3-9 in. w., lanceolate or ovate-lanceolate, acuminate, membranous, glabrous, very dark green, the base not or little reduced, sessile or with stipites narrowly margined, varying to as much as 4 in. l.; tri-quadri-pinnatifid; pinnæ numerous, spreading or erecto-spreading, sessile or shortly stipitate, much the shape of the frond, or enlarged at the base on the upper side, generally acuminate, 2-4 in. l.  $\frac{1}{2}$ - $1\frac{1}{2}$  or 2 in. w.; rachis and costæ, margined throughout with membrane, dark-coloured and glabrous; pinnulæ lanceolate or oblong,  $\frac{1}{4}$ - $\frac{1}{2}$  in. w.  $\frac{1}{2}$ —over 1 in. l., multifid tertiary divisions oblong or linear-oblong, deeply lobed or toothed; ultimate digitate, segments or teeth  $\frac{1}{4}$ - $\frac{1}{2}$  in. w., emarginate; veins simple or forked in the lobules; sori often copious, axillary; involucre cylindrical free, but slightly margined or not, the mouth usually not expanded but slightly bi-labiate, the neck often strictured; receptacles not extruded, or little or much, exserted, sometimes  $\frac{1}{2}$  in. l.—Hook. Brit. Ferns, t. 42. Eat. Fer. N. Am. Pl. 24. *T. speciosum*, Wild.

a. var. *T. Luschnatiannum*, Presl.—Fronds sessile, oblong-acuminate, segments broad or fine, and shallowly or deeply incised.—*Hymenophyllum rupestre*, Radd.

b. var. *T. Kunzeanum*, Hook.—Fronds ample, ovate or oblong acuminate; stipites 1-6 in. l.; final cutting somewhat broad or very fine.—Hook Sp. Fil. t. 39. D. *T. antillarum*, V. D. B. *T. umbrosum*, Wall.

Frequent, creeping up the sides of dripping calcareous rocks and the trunks of trees in very wet forests from sea level up to the highest elevations. There are several varying forms. The more obvious distinction are in the shape of the frond, length of petiole, depth of final cutting and width of segments, and measure of membrane that lines the vascular parts. The colour is a dark dull sea water green, and the vascular parts a blackish-brown. Since Swartz discovered it in Jamaica, the species has become famous by its discovery in the British Isles, and in other countries scattered in all temperate and torrid latitudes throughout the world. Spread from the Southern United States and the West Indies to Rio Janeiro and through the milder parts of Europe from Great Britain and Islands of the Eastern Atlantic Ocean, to Northern India, Japan, and the Polynesian Islands.

41. *T. rigidum*, Swartz.—Rootstock short, erect; stipites cæspitose, few or several, erect,  $\frac{1}{2}$ -1 li. thick, strong and wiry, 3-8 in. l. dark brown, naked or with a few small scales chiefly at the base; fronds erect, multifid, ovate-deltoid, acuminate, broadest at the base, 4-8 in. l., 3-6 in. w., dark sea green, naked or slightly ciliate on rachis and ribs, elastico-membranous, stiff; pinnæ spreading, approximate, the lowest pair in the larger fronds rather broader on the lower side, 2-3 in. l.,  $1-1\frac{1}{2}$  in. w., lanceolate-acuminate, nearly sessile; pinnulæ bi-tri-pinnatifid, approximate,  $\frac{1}{2}$ -1 in. l., 2-4 li. w.; tertiary segments cut shortly or almost to the mid-rib into linear-subulate segments, which are often again divided, into which a simple or casually forked vein runs; sori usually copious, situated in the axils of the final segments; involucre stipitate, and free, or laterally partly adherent to one of the ultimate teeth and slightly margined; mouth rather dilated, or casually two-lipped; receptacles shortly exerted.—Hedw. Fil., t. 2. Sturn, Brazil. t. 18., fig. 12.

Very abundant in wet forests of mean and high elevations, a terrestrial species which in some situations is plentifully scattered over the forest floor and on the surface of decayed logs, into which the strong, wiry roots can freely penetrate. The ultimate segments are quite subulate, but as the texture is elastical, they curl and shrivel somewhat in drying. As to the depth, and consequent fineness of the cutting, the fronds vary a good deal, which produces a corresponding, and often very considerable difference in their appearance. In some, too, the parts are crowded and overlap each other, while others are much more lax. The most finely cut, however, display their segments very clearly. There is very little membrane to the ribs, and it shows most in the axils, or the bases of the ultimate teeth. The rachis is frequently flexuose, and the faint marginal streaks often extend partly down the petiole. General throughout the West Indies and southward from Mexico to Guiana, and Brazil and in South Africa, Mascarene Isles, India, Japan, S. China, Malayan Peninsula, New Zealand and Polynesian Islands.

42. *T. Prieurii*, Kunze.—Rootstock strong, woody, erect,  $\frac{1}{4}$ - $\frac{1}{2}$  in. thick, with strong, twine-thick, wiry roots; stipites cæspitose, erect, dull-blackish, 8-12 in. l., clothed at the base with dark fibrillose scales; fronds deltoid or ovate-deltoid in shape, acuminate, tri-quadrupinnatifid, 8-12 in. l., and nearly as much wide, lowest pair of pinnæ the largest, and these more developed on the under than the upper side; very dark green, firm and rather stiff in texture, naked; pinnæ 3-6 in. l., 1-2 in. w., oblong or lanceolate, acuminate, sessile; pinnulæ  $\frac{3}{4}$  to over 1 in. l.,  $\frac{1}{4}$ - $\frac{1}{2}$  in. w., deeply pinnatifid; tertiary segments oblong or linear, and deeply cut into fine acicular segments or teeth about  $\frac{1}{8}$  li. w.; rachis and costæ flattish; sori along both sides of the pinnulæ, inserted in the axil at the base of the tertiary segments; involucre small, free, contracted at the neck under the slightly expanded, erose or dentate rim; veins simple in the ultimate segments.—Hook. Gard. Ferns, t. 11. *T. anceps*, Hook. Sp. Fil., t. 40c.

A very fine plant, much larger than *rigidum*, and of a more leafy character, though the ultimate segments are so fine. It is opaque, when dry through the reticulation of the parenchyma being so fine, and the colour is very dark, rather metallic green. The stipites are channelled, and the rachis and ribs flattened. Dominica, Trinidad, French Islands, to Brazil and Peru.

(To be continued.)

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## TRIBE II.—*Cyatheæ*.

SORI, generally more or less globose or hive-shaped; receptacles setiferous or scaly, elevated and conical or globose, occasionally only superficial, on the backs of the forked or simple veins, entire or vertically cleft in two; sporangia generally densely crowded and compressed, obovate-cuneate, or, when few, orbicular, sessile or sub-sessile, arched by a nearly vertical incomplete jointed ring, in some cases mixed with fibrillæ; involucre inferior, variable—absent, or reduced to a lateral inferior sepaloid scale, or cup-like, or completely enveloping the sori, when, in the latter case, they eventually become much ruptured and broken down; veins free or occasionally anastomosing; fronds uniform, compound or decomposed and generally large and branch-like; caudex usually arboreous, ascending and trunk-like.

The plants of this tribe, with few exceptions, are well marked by their uniformity of habit and tree-like character; and they form one of the most noticeable and graceful features in the vegetation of the West Indies. They are common at all elevations, both in open and shaded situations, but increase in variety as the cool regions of the higher elevations are approached. By the absence or presence of an involucre to the sori, and its form they are divided into three genera. In *Alsophila* the involucre is absolutely, or almost, absent; in *Hemitelia* it exists in the form generally of a lateral sepal-like scale beneath the sori, but not always observable without close scrutiny; while in *Cyathea* it is evident and partly and fully envelopes the sori. The trunk possess characteristic features, which though they cannot be briefly defined in words, soon become familiar to the eye, and are as reliable for distinguishing the different species by sight as the characters which the fronds afford; just as forest trees are recognised as they stand by a woodman by the appearance of the bark without reference to the foliage or flowers, with which, not infrequently, he is entirely unacquainted. Sloane in his "History of Jamaica" says:—"From these trees growing on the mountains of Hispaniola, the Spaniards argued the fertility of that soil, making ferns grow to such a vast bigness, which in Europe are so inconsiderable." The distribution of the tribe is principally within the tropical zone, though largely at temperate elevations

3. Involucres quite or almost absent.—*ALSOPHILA*.

4. Involucres sepal-like, lobed or circular, situated beneath the sori.—*HEMITELIA*.

5. Involucres cup shaped or completely hemispherical. —*CYATHEA*.

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## GENUS III.—*Alsophila*, R. Br.

SORI, sub-globose; receptacles elevated and conical or sub-globose, rarely superficial, situated on the backs of the veins, near the forking when the latter are branched, generally ciliate-scaly; sporangia generally densely aggregated and obovate-cuneate, rarely few superficial and orbicular; involucre quite absent, or rudimentary in the form of a thin scale beneath the sori as in *Hemitelia*; veins free; fronds uniformly ample, compound or decomposed; caudex arborescent, few or several feet high.

*Alsophila* is distinguished from the allied genera by the generally absent involucre, but in several species that have constantly been ascribed here a thin membrane, similar to that in *Hemitelia* may be detected beneath the sori by the aid of a lens and dissecting needle. With these species I have followed other authors and allowed them to remain here, though technically they do not differ

from *Hemitelia*. In some cases too a slight film covers the sori in its early stages, producing a resemblance to *Cyathea*, but which disappears with age. The genus ranges from the lowlands up to 5000 or 6000 feet altitude. There are about ninety or a hundred species, inhabiting chiefly the torrid zone of the globe and the cool elevated regions within it.

a. Fronds tripinnatifid.

b. Veins pinnate, simple.

1. *A. oblonga*, Klotzsch.
2. *A. Eatoni*, Jenm.
3. *A. echinata*, Moore.
4. *A. pungens*, Klf.

bb. Veins pinnate, forked.

5. *A. infesta*, Kunze.
6. *A. armata*, Presl.
7. *A. ferox*, Presl.
8. *A. paleolata*, Mart.
9. *A. nigra*, Jenm.
10. *A. villosa*, Desv.
11. *A. parvula*, Jenm.
12. *A. aspera*, R. Br.
13. *A. gibbosa*, Klotzsch.

aa. Fronds tri-quadri-pinnatifid.

b. Veins pinnate, forked.

14. *A. pruinata*, Klf.

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1. *A. oblonga*, Klotzsch.—Trunk erect, few to several feet high, 2–3 in. diameter, paleaceous at the top; stipites erect or erecto-spreading, strong, 1–1½ ft. l., dark brown or castaneous, glossy, armed with straight spines and freely clothed throughout the channel with linear-lanceolate attenuated scarious edged dark brown scales; fronds erecto-spreading, several, 4–5 ft. l., 1½ ft. w, chartaceous, dark green above, pale beneath, puberulous or nearly naked, the ribs rusty pubescent above; and with a few small deciduous scales beneath; rachis strong, prickly, clothed down the channel with linear attenuated rather fibrillose scales; pinnæ numerous, contiguous, erecto-spreading, passing abruptly into the terminal portion of the frond, oblong-lanceolate, 1–1½ ft. l., 3–4 in. b. sessile, or petiolate, nearly uniform in width to the shortly acuminate or acute apex; pinnulæ very numerous, spreading contiguous, linear-oblong, sessile, blunt or rounded at the apex, but sometimes acute, 1½–2½ in. l., ⅓–½ in. b., also like the pinnæ uniform in width from the base outwards, cut ⅔–¾ to the costæ into close oblong, round ended lobes, which are 1–1½ li. w., and 3 li. l. from the mid-rib; veins simple, 4–6 to a side, all fertile; sori copious, deciduous, medial; receptacles elevated, minute ciliate.

Guiana. Gathered by all collectors and spread generally over the greater part of the country, but not extending to the outer forest belt. This is the most beautiful of the native species. It is not often found however at its best, but is so characteristic as to be easily recognised in any condition. Its shuttle-cock-like habit, numerous pinnæ and pinnulæ, their uniform width from the base outwards, the freely paleaceous channel of the petiole and rachis—the scales varying from a pale chaff colour to castaneous—are its principal distinguishing features. As the scales so the surfaces vary in colour, but the upper is more or less very dark green and the under ash-gray. The trunk is usually short, and rarely found more than five feet high. It prefers damp and very shady forest and, as a rule, takes loose hold of the ground.

2. *A. Eatoni*, Jenman.—Caudex erect; stipites 1–1½ ft. l., densely clothed with castaneous scales at the base and furfuraceous throughout, abundantly armed with sharp straight and curved spines, dark or castaneous; fronds tripinnate, pellucid, chartaceous, glabrous, dull green; pinnæ spreading or erecto-spreading, the lower ones much reduced, and shortly petiolate, those above sessile, oblong-lanceolate, acuminate, 1–1½ ft. l., 3–4 in. b.; pinnulæ sessile, unequal sided, the upper side the deeper, acuminate, 2–3 in. l., ½ in. b., about 20 to a side, rather open with a space half their own width between, cut two-thirds to the costules into close, oblique oblong-obliquely rounded unserrated, even-edged lobes which are 1½–2 li. w., 2 li. d. to the sharp close sinus, the space between the sinus and the costule about 1½ li. d.; rachis and costæ dark brown, rusty villose down the face, dark scurfy and puberulous-scaly on the back; costulæ rusty villose down the face, beneath scurfy and copiously clothed with dark brown bullate scales; veins simple, pellucid, 4–5 to a side, lowest pair terminating just above the sinus; sori small, medial, occupying three or four of the veins on each side; receptacle small, scaly.—*Jour. of Bot.*, vol. 25, 1887, p. 98.

Trinidad. Intermediate in character between *oblonga* and *echinata*; marked by its dull colour, thinly chartaceous texture, pinnules deeper on the upper than the lower side, cut hardly two-thirds down to the costule, the point acuminate and serrulate, the sessile bare rather oblique, few simple veins, small deciduous medial sori. The lobes are nearly as broad as deep and slightly curved outwards, the margin quite entire and even. Mr. Baker regards this as *echinata*, both of which he regards as *aspera*, but *aspera* does not inhabit Trinidad at all. From *echinata* it is distinguished by the form of its pinnulæ and lobes, the even margin of the latter, its dark colour of stems, and abundant dark vestiture, bullate scales, and uniformly sessile pinnules. The two species can be easily distinguished at sight.

3. *A. echinata*, Moore.—Caudex few to ten ft. high. 2–3 in. diameter, erect, paleaceous at the top; stipites spreading 2–3 ft. l. channelled, glossy wood coloured above, dark brown beneath, armed with short straight spines, clothed at the base with lanceolate or ovate-lanceolate, scarious edged, acuminate, scales, which vary from chaff coloured to chesnut brown; fronds spreading 2–5 ft. l., 1½–3 ft. w. chartaceous, dark green above, paler beneath, naked or with a few slight scales on the ribs beneath, tripinnatifid; pinnæ alternate, petiolate, articulate, 1–1½ ft. l., 5–9 in. w. sub-distant, about 6–8 to a side, abruptly passing into much reduced pinnules which together form the terminal portion of the frond; costæ membrane-margined or winged, at least in the outer part; pinnulæ spreading, contiguous or sub-distant, stipitate or the upper sessile, articulate at the base, 2½–4½ in. l., ½–1 in. w. with a serrate acute or rounded end, the base slightly reduced or not, pinnatifid to about a line of the costulæ; segments close or with a more or less acute or open and rounded sinus between, oblong or linear oblong, 1½–2 or 3 li. w., 4–6 li. l., obliquely acute or blunt at the end, nearly even or conspicuously crenate-dentate; veins simple, 6–8 to a side, all fertile; sori medial or nearer the margin within, very deciduous; involucre ciliate.

*a. var. A. bipinnatifida*, Baker, *Syn. Fil.* 2nd Ed., p. 456.—Root-stock fibrous, acaulescent; petioles slender, prickly, with chaff-coloured scales at the base; fronds bipinnatifid, 1½ ft. l., 7–8 in. w.; pinnæ

truncate, stipitate, 3-4 in. l.,  $\frac{3}{4}$  to 1 in. w. sub-distant.—(Appun. 1032.) Like a common bipinnatifid *Lastrea* or *Phegopteris* but for the prickly stems.

*b. A. nitida*, Kze.—Trunk short and slender, about 2 ft. high, petioles a span to  $1\frac{1}{4}$  ft. l., prickly and freely scaly; fronds bipinnate;  $1\frac{1}{2}$ -2 ft. l.;  $\frac{3}{4}$ - $1\frac{1}{4}$  ft. w.; pinnae well apart, stipitate,  $1\frac{1}{2}$ -2 in. w.; costae winged; pinnulae oblong,  $\frac{3}{4}$ -1 in. l.,  $\frac{1}{4}$ - $\frac{1}{3}$  in. w., rounded or acute, sessile and free, the outer connected, rounded at the end or acute, crenate-lobate.

Porto Rico, Santa Cruz, Trinidad, Guiana, common and plentiful in certain situations of low or relatively low altitudes. A highly variable species, presenting the three distinct states described. The larger state has been ascribed to *A. procera*, Klf. and *A. aspera*, R. Br. It is not *A. aspera*, but should it be *A. procera*, Klf. which I have not seen,—that name would have priority. The three states appear to be fixed and distinct, yet it is impossible to mistake their specific unity. Eaton ascribed the species to *A. nitens*, J. Smith which is a synonym of *A. aspera* R. Br.

Var. *a.*, as mentioned, is like a common *Lastrea* or *Phegopteris* for the latter of which it would certainly be taken, but for the prickly petiole and abrupt chaff-coloured vestiture at the base.

Var. *b.* is intermediate in size and cutting between this and Moore's type, which is the largest state.

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4. *A. pungens*, Klf.—Caudex erect; petioles armed and paleaceous; fronds ample, tripinnatifid; pinnae  $1-1\frac{3}{4}$  ft. l., 5-7 in. w., lanceolate-acuminate, spreading, or the outer ones erecto-spreading, the outer part pinnatifid passing into a sub-entire end; pinnulae spreading, sub-sessile, contiguous or more apart, alternate, tapering at the end into a rather long sub-entire, acuminate point,  $\frac{3}{4}$  in. w.,  $3-3\frac{1}{2}$  in. l., cut two-thirds or three-fourths to the costae into flat rather broad oblique or subfalcate lobes, which are  $2-2\frac{1}{2}$  li. w.  $\frac{1}{4}$ - $\frac{1}{3}$  in. l. to the narrow sinus; texture firm but hardly more than chartaceous; colour grayish-green; surfaces naked or with a few small scales scattered on the costae and ribs; margins entire or faintly crenulate; veins simple, curved, 6-8 to a side; sori medial, minute.

Guiana, Schomburgk n. 1666. Herb. Sagot, n. 726. This most resembles *A. echinata*, but is remarkable for the comparatively long subentire ends of the pinnulae. If it is distinct from the preceding species it has not been gathered in British Guiana since Schomburgk found it, and his label conveys no information as to the region it inhabits.

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5. *A. infesta*, Kze.—Caudex rather slender, becoming at length several or many feet high, prickly, and clothed upwards with rather large pale-coloured scales; stipites armed, clothed at the base with scales similar to those of the trunk; fronds large, 3 ft. w., 4-6 ft. l., tripinnatifid, chartaceous, light green, beneath rather primrose; pinnae spreading, 10-18 in. l., 4-6 in. w., acuminate, sessile; pinnulae contiguous, 2-3 in. l.,  $\frac{3}{4}$ -1 in. w., serrato-acuminate, sessile or the lower ones not; cut down almost to the costulae into flat, toothed or crenate ultimate segments, which are nearly or quite  $\frac{1}{2}$  in. l.,  $1\frac{1}{2}$ -2 li. w., obtuse-acute, with a sharp cartilaginous sinus between, a few scattered



bullate scales on the costulæ beneath, the other surfaces naked; veins 2-3 times forked; sori situated at the primary forking of the veins; capsules mixed with minute scales.

West Indies generally and Guiana. A very distinct and easily recognised species. In the smaller pinnæ the margins are quite even while in the larger they are uniformly serrulate. Both pinnæ and pinnulæ are sessile. The plant so very abundant in Grenada between the middle and higher elevations, referred by Mr. Baker in his enumeration of the Ferns of that island to *Cyathea muricata*, Kaulf (non Willd.) is this. Before the sori break up they are covered with a film, as if varnished, which disappears with the disruption, and this appears to have been mistaken for an involucre.

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6. *A. armata*, Presl.—Stem attaining many feet high, 2-4 in. diameter, clothed above with chaff-coloured scales, stipites clothed with similar scales, and freely armed with curved sharp prickles; fronds large, 4-6 ft. l.,  $\frac{2}{3}$  ft. w. tripinnatifid, densely pilose, pale green, rather flaccid, at length chartaceous; pinnæ nearly opposite, 1-1 $\frac{1}{2}$  ft. l., 4-6 in. w. acuminate, sessile; pinnulæ sessile, close,  $\frac{1}{3}$ - $\frac{1}{2}$  in. w. 2 $\frac{1}{2}$ -3 $\frac{1}{2}$  in. l. serrate-acuminate, deeply pinnatifid, segments oblong, blunt, subfalcate, crenate-serrate, 3 li. l., 1 li. w.; veins forked; sori small, copious; receptacle slightly scaly.

Jamaica to Guiana. Common, scattered or gregarious, on declivous wayside banks, in open valleys, or in light forest, from 2,000-5,000 ft. alt. or rather higher. A rival of *Cyathea arborea*, whose place in open situations it takes at higher altitudes, in charming gracefulness. It is perhaps the tallest of the Jamaica tree ferns, and frequently occurs from 30-50 ft. high, the head gradually diminishing in size as the stem lengthens. Occasionally the trunk is branched, bearing two or more crowns. Easily recognized by its copious soft pubescence, and pale chaff-coloured scales widely spread throughout Trop. Am.

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7. *A. ferox*, Presl.—Caudex rather slender, few or several feet high, clothed upwards with linear attenuated dark coloured scales; stipites 2-2 $\frac{1}{2}$  ft. l. dark bright brown, armed with short stiff spines, and clothed freely with narrow attenuated castaneous scales; fronds 4-5 ft. l., 2 $\frac{1}{2}$ -3 ft. w., tripinnatifid, chartaceous, bright green, glandulose-puberulous beneath; pinnæ petiolate, 1 $\frac{1}{2}$ -1 $\frac{3}{4}$  ft. l., 5-8 in. w.; pinnulæ 1 in. or less apart, nearly or quite sessile, 3 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. w., very deeply pinnatifid; tertiary segments linear-oblong, acute, 5-6 li. l. 1 $\frac{1}{4}$  li. w., sub-falcate; margins serrated; costæ with a few scattered spines near the base, puberulous beneath, light rusty pubescent above, as are the costulæ on both sides; veins forked, 10-12 to a side; sori copious, situated at the forking of the veins; receptacles densely fibrillose.—*A. aculeata*, J. Sm.

Trinidad and Guiana, and there are specimens in J. Smith's collection of ferns in the British Museum Herbarium ascribed to Jamaica, and derived from Wilson. Wilson discovered four or five tree-ferns in Jamaica that no other collector has fallen in with. If there be no mistake as to the source of the specimens alluded to, this species has not, I believe, before been found so far North, though it is one of the most abundant on the mainland South of Panama. Its nearest affinity is with the preceding species, which it much resembles in cutting and colour, but from which it is distinguished by the dark coloured scales and glabrous surfaces. The trunk, too, is much more slender and shorter, and the fronds more prickly, the prickles extending to the base of the lower costæ—a rather unusual feature.—Panama to Brazil.

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8. *A. paleolata*, Mart.—Trunk several feet high; petioles unarmed, slightly scaly and puberulous at the base, articulated, wood

or dark brown, channelled; fronds tripinnatifid, ample, chartaceous, copiously hairy beneath and on the ribs above, dark green on the upper side, very pale on the under; pinnae 1-1½ ft. l., 4-5 or 6 in. w. almost sessile, contiguous or more or less distant, the apex acuminate and serrato-entire; costae puberulous beneath and freely warty, channelled on the face and dark villose, light brown beneath; pinnulae numerous, sessile throughout, paced with nearly their own width between, lanceolate, 3 in. l., ½ in. w., the acuminate end blunt and serrato-entire, cut almost to the costules into rather broad, close, oblong, rounded, slightly oblique even-edged lobes, which are 1½ li. w. and ¼ in. l. with a narrow sinus between, very hairy, the costules and ribs bearing copious deciduous acuminate meal-coloured bullate scales; veins forked; sori copious inserted at the forkings, not reaching the apex of either lobes or pinnules; receptacles densely clothed with pale paraphyses (hairs).—*A. Gardneri*, Hook.

This is marked by its dense hairiness, and abundant light coloured paraphyses mixed with and concealing the sporangia, its bullate scales, and very pale underside of the parts. Its nearest likeness in vestiture is to *Cyathea furfuracea*, Baker, but it is larger—The Guianas and Brazil.

9. *A. nigra*, Jenm. n. sp.—Caudex and petioles not seen; fronds tripinnatifid, 5-8 ft. l., 2-3 ft. w. sub-coriaceous, dark green above, pale beneath, ribs throughout scaly on both sides; rachis and costae unarmed, blackish, glossy, relatively slender, decidedly scaly; pinnae spreading, petiolate (the superior sessile) 1½-2 ft. l., 6-8 in. w. serrato-acuminate; pinnulae contiguous, alternate, sessile, oblong-lanceolate, serrato-acuminate, 3-4 in. l., ½-¾ in. w. pinnatifid almost to the axis; segments obtuse, not crenated, 1½ li. w., curved, obliquely dilated at the base, the sinus acute; veins forked, the outer simple.

Trinidad Herb., locality and collector unrecorded; distinguished from other West Indian tree ferns by the purple-blackish unarmed rachis and costae.

10. *A. villosa*, Desv.—Caudex reaching 6-7 ft. high; stipites spreading 1-1½ ft. l., strong muricate, dark brown, densely clothed at the base with long, linear, attenuated castaneous scales which are 1 li. w. at the base, and ½ to over 1 in. l.; fronds tripinnatifid, medium sized, stiff and coriaceous, dull green; pinnae 1-1¼ ft. l., 3-4 in. b., numerous, alternate, erecto-spreading, very shortly petiolate, contiguous and often over-lapping, the end lobate, acuminate; pinnulae close or with their own width or less between, sessile and tapering outwards to a blunt but often acute subentire point, erecto-spreading, 2½-3 in. l., ⅓-⅔ in. w., deeply pinnatifid or the lower part fully pinnate; segments oblong, rounded, entire, 1-2 li. w. 2-3 li. l.; both sides more or less fibrillose or the upper ultimately naked; rachis, costae and ribs dark brown or castaneous, pubescent above, beneath glabrous; sori very copious, occupying all the lobes, medial, mixed with copious fibrillae; veins 5-7 to a side, forked.—*A. rigida*, Mart. *Cyathea* H.B.K.

Guiana, over the sandstone region, gathered by Schomburgk and Appun and lately at Spelemoota on the Arapoo River by Im Thurn. A slender but very coriaceous and rigid species, with numerous close pinnae, erecto-spreading, as are also the pinnulae, the final segments being oblong or elongato-deltoid. The sori are very copious and seem when mature to quite cover the surface of the seg-

ments. The petioles are wood-brown and not prickly but warty and asperous as in the Jamaica form of *Cyathea arborea*, and are most densely clothed at the base with the narrow attenuated dark-brown scales. Both surfaces are at first clothed with pale wool-like fibrillæ, much of which drops away in course of time, leaving the rachises and upper surface nearly naked, but the underside remains coated.—Venezuela and Brazil.

11. *A. parvula*, Jenm.—Stem slender, reaching 30 ft. high, scarred, clothed at the top with pale scales; stipites few or several, 1–1¼ ft. l. slender, curved, pale brown, with short blunt spines beneath, and at the base pale chaff-coloured scales; fronds 3–4 ft. l., 1–2½ ft. w., pendent in the outer half, light green, paler beneath, chartaceous, tripinnatifid; pinnæ  $\frac{3}{4}$ –1 ft. l., 4–6 in. w. shortly acuminate, not sessile, pubescent on the costæ above; pinnulæ, except the basal ones, sessile, serrulate-acuminate, 2½–3 in. l.,  $\frac{1}{3}$ rd– $\frac{2}{3}$ rd in. w. deeply pinnatifid; final segments oblong, blunt, 3–5 li. l., 1½–2 li. w. crenulate-dentate, a few small bullate pale scales in the axils beneath; veins once forked, sori copious, ascending half or two-thirds up the segments; attached near the forking.—Journ. Bot. 1879, p. 258. *Hemitelia microsepala* Jenm. in Journ. Bot. n. s. vol. viii, p. 258.

Jamaica, common in shaded and open situations at 2,000–3,000 ft. alt. in both the eastern and western parishes. It differs from the preceding in its smaller more numerous fronds, pale colour, chaff-coloured vestiture, deeper cutting of the pinnules, and slighter, but much denser stem, which reaches eventually double or treble the average height of the stem of that, and is about as thick as a broom stick. A slight scale-like involucre may be detected by the aid of a lens in some specimens beneath the sori. The pinnæ resemble in form and size those of *Cyathea dissoluta* very closely; Cuba, and probably other islands.

12. *A. aspera*, R. Br.—Stem rather slender, and of medium height, with dark coloured vestiture above; stipites few, dark, prickly beneath, 3–3½ ft. l. clothed with bright chestnut scales, fronds tripinnatifid, 5 or 6 ft. l. 3–3½ ft. w. dark-green, subcoriaceous; pinnæ 1¼–1¾ ft. l., 5–8 in. w., stipitate, not close, lowest a little reduced; pinnulæ almost touching, or more or less apart, nearly or quite sessile, serrulate-acuminate; segments rounded, broadish, oblong,  $\frac{1}{4}$ – $\frac{1}{2}$  in. l., 1½–2½ li. w., the edges serrulate; costæ and costulæ rusty pubescent above, a few dark bullate scales on the ribs beneath; veins once forked, 5–7 to a side; sori medial, copious, situated at the forking of the veins.—Hook Sp. Fil. t. 19 B.; Plum. Fil. t. 3. *A. nitens* J. Sm.

var. *major*. Pinnulæ, 1 in. w. 3½–4 in. l.

var. *minor*. Pinnulæ  $\frac{1}{2}$  in. w. 1½–2 in. l.

Jamaica, St. Vincent, French Islands abounding in forests and half open situations from 500–4,000 ft. alt. The stem is rather slender and of low density, usually 5–10 ft. high, but reaching 15 ft.; fronds relatively large and few. The dark colour, and dark chestnut scales distinguish it at sight. A slight scale-like involucre may be detected on removal of the sori by careful microscopical examination. Probably general throughout the West Indies, except Trinidad.

13. *A. gibbosa*, Klotzsch.—Caudex stout, short; stipes several ft. l., scaly at the base, muricate; fronds very large, 9–12 ft. l., tripinnatifid; pinnæ numerous, spreading, alternate, 2–3 ft. l., 9–12 in. w., freely petiolate, passing gradually into the pinnatifid acuminate outer part; rachis and costæ brown or castaneous, sparsely muricate, naked and glossy; costæ and costulæ like-coloured, rusty-tomentose on the upper side; texture rigid; colour dull-green, paler beneath;

surfaces glabrous; pinnulæ 5-6 in. l., 1 in. or over w., articulated at the gibbous base, deciduous, petiolate, acuminate, with a finely serrulate point, oblong lanceolate, cut  $\frac{3}{4}$ ths- $\frac{4}{5}$ ths to the costæ into broad rounded sub-falcate, close crenate lobes  $2\frac{1}{2}$  li. w.  $\frac{1}{3}$ rd- $\frac{1}{2}$  in. l.; veins forked, curved, 8-12 to a side; sori at the forking of the veins; receptacles rather scaly.

British Guiana, Schomb. 1124; Appun 1052; Spruce 4331. A very large species, very stiff and thick in texture. Spruce says, "Caudex and fronds 22 ft. long, threading and twining amongst the adjacent branches, bipinnate; stipes 7 ft., pinnæ 16 on each side"; remarkable for its large size and the articulate and deciduous pinnulæ. Appun gathered it at "Quating Creek."—Brazil.

14. *A. pruinata*, Kaulf.—Stem short, rarely 3 ft. high, stout, clothed densely with laniferous scales; stipes 3-6 ft. l. or more, arching, faintly impressed, rather polished, naked, except at the base; fronds 4-6 ft. l., 3-5 ft. w. sub-deltoid, tripinnate, pale-green above, frost-coloured beneath soriaceous costæ and cestulæ pubescent above the pinnulæ lanate on the ribs beneath; pinnæ large apart, petioled lowest pair deflexed and a little reduced, next above  $1\frac{1}{4}$ - $2\frac{1}{2}$  ft. l., 6-10 in. w.; pinnulæ lax, petiolate, 3-6 in. l., 1- $1\frac{1}{2}$  in. w. serrate-acuminate, the lowest segment situated on the superior side; tertiary segments  $\frac{1}{2}$ - $\frac{3}{4}$  in. l.,  $1\frac{1}{2}$ -3 li. w. acute, deeply cut into deltoid lobes; veins pinnate, forked in the final lobes; sori at the base of the lobes at the apex of the lowest venule on the upper side near the crenulate sinus; sporangia few, rather large, roundish, mixed with copious lanate scales.—*Polypodium*, Swartz. *Lophosoria*, Presl., Plum. Fil. t. 33.

Jamaica to Trinidad. Very plentiful in forest shade from 3,000 ft. alt. to the highest ridges. The caudex, which is 3-4 in. in diameter, buds and throws up from the base a number of minor stems about half the size of the primary one. The petioles are sometimes as much as 10 ft. l. giving the fronds an immense spread. In shape of frond, character of vestiture and scant number of capsules, it differs materially from all the other species. An abnormal species, arbitrarily placed here. It has so little in common with either *Polypodium* or *Alsophila* that it would be better to recognise it as a separate genus under Presl's name, *Lophosoria*.—Mexico to Chili and Juan Fernandez.

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#### GENUS IV.—*Hemitelia*, R. Br.

Sori subglobose, receptacle elevated, often cleft and bilobed, scaly, situated on the back of the veins near to or distant from the forking; sporangia numerous and densely packed; involucre partial, sometimes absent, embracing the sori from the inner side beneath, sepal or kidney-shaped and bilobed, and shallowly quite circular; fronds generally ample; veins free or the costal united; caudex erect, usually aboreus.

The size and form of the involucre, upon which this genus depends for its generic character, are not very definite, and show a gradual passage from *Alsophila*, in which they are quite absent or merely rudimentary and only discernible by close microscopic scrutiny, into the cupshaped involucre of some of the species of *Cyathea*; so that but for the disadvantage of upsetting established

names, the three genera might well be merged into one. In the form and cutting of the plants in this genus, there is great divergence and much variety.

Grisebach confined the genus to *Cnemidaria*, Presl., and would remove the more compound species in which the sori is inserted at the forking of the veins, such as *H. multiflora*, R. Br., to *Alsophila*.

a. Veins in groups or fuscicles.

b. Fronds bipinnatifid.

c. Lower pair of opposite veins united, forming a costal arch, the rest free.

1. *H. subincisa*, Kze.
2. *H. grandifolia*, Spreng.
3. *H. Imrayana*, Hook.
4. *H. horrida*, R. Br.

bb. Fronds bipinnate.

cc. All veins free.

5. *H. marginalis*, Jenm.
6. *H. sagittifolia*, Jenm.

aa. Veins pinnate.

b. Fronds tripinnatifid.

c. Veins simple or forked.

7. *H. Wilsoni*, Hook.
8. *H. sessilifolia*, Jenm.
9. *H. manocarpa*, Presl.
10. *H. macrosora*, Jenm.
11. *H. Sherringi*, Jenm.
12. *H. trinitensis*, Jenm.
13. *H. Leprieuri*, Jenm.
14. *H. multiflora*, R. Br.

1. *H. subincisa*, Kze.—Stipites strong, 1-2 ft. l., naked or furfureous, dark-brown or castaneous; fronds pinnate, oblong-lanceolate, with a distinct terminal lobed or pinnatifid pinnae; rachis brown or castaneous, rather polished, channelled, naked; pinnae in distant, spreading, sessile pairs, 8-10 in. l.,  $1\frac{1}{4}$  in. w. very acuminate, with a serrulate point, within this cut into shallow lobes  $\frac{1}{6}$ th- $\frac{1}{3}$ rd deep, which are flat and rounded, and  $\frac{1}{4}$  in. w., the margins somewhat crenate, or even; texture chartaceous, colour dark-green, and glossy above, paler beneath; surfaces naked; veins simple, evident, the opposite lowest pair connected forming a costal arch sending branches to the sinus; sori nearly medial, in an intramarginal line, or, in the less cut state, one on each side of the mid-rib, but not close thereto; involucre bilobed.

Guiana, Appun 1035, Quating Creek and 1127. Roraima. Resembling the narrowest forms of *grandifolia* though less deeply cut, with a sinuous or lobed margin and constantly simple veins; sometimes however the veins from the costal arch are in pairs thus making four branches instead of two. Appun's specimens are ascribed to this species but they do not differ much from some of the narrower states of *H. obtusa* Klf.—Peru, Guatemala, and Ecuador.

2. *H. grandifolia*, Spreng.—Caudex erect, 2-2 $\frac{1}{2}$  in. thick, rather fibrous, scaly above; stipites caespitose, clothed at the base like the rootstock, armed with short stiff spines, castaneous, 1-2 ft. l., fronds erecto-spreading, oblong-lanceolate, bipinnatifid, the apex forming a separate pinnatifid portion; pinnae in numerous spreading opposite pairs,  $\frac{1}{2}$ - $1\frac{1}{4}$  ft. l.,  $1\frac{1}{2}$ - $2\frac{1}{2}$  in. w., sessile, acuminate with a serrate-entire

point, of a uniform width from the base, cut half way to the costal into close, rather curved, quite uniform flat broad lobes, which are obliquely rounded and  $\frac{1}{4}$ - $\frac{1}{2}$  in. w. and even or slightly crenulate on the outer margin; rachis brown, naked, as are the general surfaces; veins once or twice forked, the lowest opposite pair united and forming a costal arch sending branches to the sharp and close sinus; sori dorsal, forming a generally straight intramarginal line; involucre very membranous, entire or bilobed, clasping the sori.—Hk. Sp. Fil. t. 14.

Var. *H. obtusa*, Klf.—Fronds smaller; pinnæ 1-1 $\frac{1}{2}$  in. w., lobes much smaller, crenated round the broad obliquely obtuse or rounded end; texture firmer.—Hk. Sp. t. 14, Fig. B.

West Indies generally and Guiana.—A relatively slender species, distinguished by this character, the more or less narrow pinnæ nearly the same width from the base outwards, the broadly rounded segments and intramarginal line of sori. *H. speciosa* Klf. (non Hook) of Grisebach's Flora is evidently a form.—Venezuela.

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3. *H. Imrayana*, Hook. Jenm.—Stems short, stout, erect; stipites erect, scaly at the base and prickly; fronds bipinnatifid, the apex simply pinnatifid with entire lobes, chartaceous, bright green, naked, or the ribs slightly tomentose beneath, pinnæ spreading, approximate, or the lower distant, in opposite pairs, becoming alternate above,  $\frac{1}{2}$ -1 $\frac{1}{4}$  ft. l., 1 $\frac{1}{2}$ -3 in. b., sessile, the acuminate apex entire, within this cut down  $\frac{3}{4}$  to the costæ into flat acuminate sub-acute or rounded lobes 1-1 $\frac{1}{4}$  in. l. from the acute or rounded sinus;  $\frac{1}{4}$ - $\frac{1}{2}$  in. w.; margins even, or crenate-dentate or serrulate with rounded lobules; veins fine, close, once forked or in fascicles of 2-3 or more running parallel to the margin, the opposite basal pair uniting, forming a longitudinal costal arch from rib to rib with branches running to the sinus; sori forming a direct or slightly sinuous line just within the margin; involucre shallow, thin, simple or often at length bilobed.—Grisebach, Fl. B. W. I., I. p. 706. Plum. Fil. t. 26 (double lines of sori wrongly shown.)

The West Indies generally from Cuba to Trinidad. This is a variable species, the larger states approaching *horrida* and the smaller *grandifolia*. The variations are in the size of the fronds and pinnæ, the finely acuminate or broadly rounded lobes or pinnules the serrated or even margins and sharply acute or open rounded sinuses, *H. horrida* is a far more robust plant than the largest of the states described above. Possibly, as the states included vary so much, they may represent more than one species or sub-species.

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4. *H. horrida*, R. Br.—Stem short, 6-10 in. thick; stipites erect, strong, armed with short strong spines, and scaly at the base; fronds ample, erect bipinnatifid 4-7 ft. l., 2 $\frac{1}{2}$ -3 $\frac{1}{2}$  ft. w., subcoriaceous, glabrous, or the ribs beneath glabrescent-tomentose, dark-green and glossy above, beneath pale; pinnæ spreading or erect-spreading, 1-2 ft. l., 4-8 in. w., sessile, and opposite or nearly so, deeply pinnatifid, the acuminate point entire; pinnulæ close, with an acute or slightly open sinus between, 2-3 $\frac{1}{2}$  in. l.,  $\frac{1}{2}$ - $\frac{5}{8}$  in. w., the connected bases slightly dilated, tapering to the slightly serrated acuminate point, the margins within this entire; veins fine, close, in fascicles of 4-5 usually 4, which run parallel into the margin, the opposite basal pair united forming a costal arch below the sinus to which a vein runs from the

angle; sori forming a rather crowded simple or pseudo-double straight or sinuous row shortly within the margin; involucre thin, bilobed, often nearly surrounding the sori, but open on the outer side.—Plum., Fil. t. 8; Hook, Sp. Fil. vol. 1 t. 15, and Fil. Exot. t. 69.

var. *H. Hookeri*, Fee.—Very robust, the larger pinnæ fully pinnate at the base, the inferior pinnulæ sinuate or shallowly lobed within, the lowest pair pinnatifid on the lower side; lines of sori deeply sinuous; veins more open and more branched.—Gr Fl. B. W. I., p. 706.

General throughout the West Indies from Cuba to Trinidad. Frequent in damp forests, especially near banks of streams, from the lower hills up to 4,000 ft. alt. The short thick trunk is clothed with the persistent decaying fibres of past petioles. Occasionally it is found in open situations, when generally it does not attain more than half its maximum size, and the sori run in straight lines. A massive plant of grisly aspect as seen in the dark wet forests where it attains its greatest size.—Venezuela.

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5. *H. marginalis*, Jenm.—Caudex unknown, petioles densely furfuraceous beneath, clothed on the upper side with attenuated chaff-coloured or light-brown scales; fronds bipinnate, with a terminal pinna and several alternate lateral ones, coriaceous, dark-green above, pale beneath, both sides glossy; rachis more or less scaly, other parts naked; pinnæ 9-15 in. l., 3-4 in. w. shortly petioled or often sessile, with a gibbose articulation at the base, the apex lobate-entire; pinnules spreading horizontally, contiguous, alternate, sessile, but free and truncate or equally cordate at the base, ligulate-oblong, acuminate, acute, or rounded,  $1\frac{3}{4}$  in. long,  $\frac{1}{3}$ - $\frac{1}{2}$  in. w.; margins crenate, or the outer part serrulate; veins free, fascicled, branches 3-4, simple; sori forming a straight or subsinuous line, just within the margin, close together, occupying all the veins; involucre absent; receptacles densely scaly.—*Alsophila*, Klotzsch.

Guiana, Schomburgk, n. 1129; Appun, n. 1377. Roraima. This is a true *Hemitelia*, closely resembling the *Cnemidaria* group, though the involucre appears to be absent. It is well marked by its simply bipinnate cutting, coriaceous texture, and chaffy clothing of the petioles and rachises. Schomburgk and his countryman Appun seems to have been the only collectors of it in Guiana. It is also ascribed to Mexico.

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6. *H. sagittifolia*, Jenm.—Caudex not seen; stipites paleaceous, muricated or asperous, dark-brown glabrous; frond 4-5 ft. l. bipinnate, abruptly passing into a distinct, pinnate, terminal pinna, coriaceous and stiff, bright-green, naked or with a few scattered broadish pale scales in the ribs beneath; pinnæ oblong-lanceolate,  $\frac{3}{4}$ -1 ft. l., 2-3 in. w., the lower ones somewhat reduced and deflexed; pinnulæ 1-1 $\frac{1}{2}$  in. l., 3-4 li. w. sessile, the base equal sided and cordate, ligulate; margins crenulate; veins fascicled, 3-5 to a group; sori globose, rather large, medial between the margin and midrib; involucre not observable.—*Alsophila*, Hook.

Trinidad, gathered by Purdie, Cruger and Prestoe, Hart, and other collectors. I have removed this and the preceding species from *Alsophila* to *Hemitelia*, with which by natural affinities they are closely connected, though, dealing with over-ripe specimens, I have failed to detect any evidence of even a rudimentary involucre which is often detectable in species referred to the genus *Alsophila*. I regard this as a more natural and intelligible course to follow, rather than segregation by the presence or absence of an involucre to the sori,—an entirely arbitrary feature in the Cyatheaceous tree-ferns, varying from species to species,

causing in several cases an absolute disjointure of allied forms. As I have said before, it would be better to keep all the plants of *Cyathea* as one genus, dividing them into groups by their natural affinities, after which the presence or absence and form of the involucre might be used in making sub-groups within each primary group.

7. *H. Wilsoni*, Hook.—Stem several feet high, scaly above; stipites 2-3 ft. l. clothed with scales at the base; fronds ample, bipinnatifid, 4-5 ft. l.,  $2\frac{1}{2}$ -3 ft. w., chartaceous, pellucid, naked or the ribs beneath slightly tomentose, and with the costæ sprinkled with few or several deciduous whitish scales; pinnæ  $1\frac{1}{2}$  ft. l. or over, 5-8 in. w., shortly stipitate or sessile, alternate, bipinnatifid, the apex pinnatifid, pinnulæ alternate, the inner free, sessile, the outer adnate, spreading, deeply pinnatifid, or only lobed or sub-entire, as are the outer ones, acuminate and serrate-entire at the apex, 3-4 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. w.; segments straight or subfalcate, close with a narrow sinus, entire or the rounded point crenate,  $1\frac{1}{2}$ -2 li. w.; veins all free, the lowest excurrent above the sinus, regularly pinnate, or fascicled in the less cut pinnulæ, the branches simple or once forked; sori medial; receptacles scaly; involucre conspicuous, bilobed, thin, brown.—*Alsophila Elliotti*. Baker in the *Annals of Botany*, vol. vi., No. xxii., April 1892.

Jamaica and Grenada, infrequent or local in moist situations from 1000-3000 ft., gathered by Wilson in Jamaica at Mansfield near Bath, and since by Syme, Sherring, and Hart near Mount Moses, and Claverty Cottage and other places; and in Grenada by Elliott and Sherring. The specimens present two states: in one the pinnulæ are sub-intire or lobed only in the outer part, the inner half being narrowed, and the base fully adnate; in the other they are uniformly and deeply pinnatifid throughout and the base is free but quite sessile. Wilson describes the trunk as slender and several feet high; Syme says eight feet. The Grenada plant is quite identical, though the few specimens, gathered in the open, are smaller. Probably the species varies there as it does in Jamaica with the conditions of its immediate environment.

8. *H. sessilifolia*, Jenm.—Caudex stout, reaching several ft. high; stipites 2-2 $\frac{1}{2}$  ft. l. prickly; fronds ample, tripinnatifid, 8-9 ft. l., 3-3 $\frac{1}{2}$  ft. w., rachis stramineous, prickly; pinnæ sessile,  $1\frac{1}{2}$ -2 ft. l., 6-8 in. w. light-green, paler beneath, chartaceous, slightly ciliate on the ribs and veins beneath; pinnulæ apart, 3-3 $\frac{1}{2}$  in. l.,  $\frac{3}{4}$  in. w. all quite sessile, acuminate, cut  $\frac{1}{2}$  or  $\frac{2}{3}$  to the costules into rather broad rounded or sub-acute lobes 2-4 li. b; sori reaching to the top of the segments, rather nearer the margin impressing the surface on the upper side; involucre absent; receptacles naked.—*Alsophila Jenm.* in *Journ Bot. n. s.* vol. xi., p. 325.

Jamaica, Mansfield near Bath: Wilson in Herb. Kew No. 520 and in Herb. Brit. Mus. No. 513 A 1 and 520; gathered in 1858, and described in the note attached as possessing a strong prickly trunk, 14 ft. high and 1 ft. 10 in. in circumference, covered with roots, the leaf and stipe together being 11 ft. 6 in. l. The thinner texture, pale color, sessile pinnæ and simple veins distinguish it from its allies. It is probably a non-indusiate state of *Wilsoni*, Hook, which it very closely resembles in the largest states.

9. *H. macrocarpa*, Presl.—Caudex few or several ft. l., rather slender, densely clothed above with pale linear-attenuate scales; stipites erecto-spreading unarmed, densely clothed in the lower part like the caudex,  $1\frac{1}{2}$  ft. l. 3 ft. w., ovate bi-tri-pinnatifid, chartaceous, light-green or rather glaucous beneath, dark and glossy above; rachis and costæ castaneous; pinnæ  $1\frac{1}{2}$  ft. l. 8-10 in. w., petiolate from  $\frac{1}{2}$ -1 $\frac{1}{2}$  in.,



the apex serrato-acuminate, the inferior ones reduced; pinnulæ spreading, sub-contiguous, sessile or the larger slightly stipitate, 4-6 in. l.  $1-1\frac{1}{4}$  in. w., serrato-acuminate, lobed or deeply pinnatifid; segments  $\frac{1}{4}-\frac{1}{3}$  in. b., deltoid oblong, sub-rounded, the margin toothed, the outer part most deeply, veins fine, 5-7 to a side, once forked in the outer half; sori large, medial, situated at the forking of the veins; involucre monophyllous, or bilobed; receptacles densely ciliate.

Guiana, widely spread, gathered on the Corentyn, Essequeibo and Potaro rivers and in the forest near the Kaieteur Fall. It was first gathered by Appun, his n. 193 locality not recorded. It differs from *macroSORA* by its papyraceous pellucid substance, broader parts, and more conspicuously dentate margins. It is one of the most beautiful plants of the group.—Brazil.

10. *H. macroSORA*, Jenman.—Trunk unknown; stipites  $1\frac{1}{2}$  ft. l. or more, stout, erecto-spreading, channelled, dark castaneous, asperous with copious minute warts, and very densely clothed on both sides with glossy linear attenuated golden or dark-brown scales which are  $\frac{1}{2}$ -1 in. l., and  $\frac{1}{2}$ -1 li. w.; fronds ample, long and pendulous, 2-3 ft. w., tripinnatifid, dark glossy green, thick and coriaceous, glabrous, but with a few scattered scales on the costæ and ribs; pinnæ laxly set, alternate, spreading and recurved,  $1\frac{1}{2}$ - $1\frac{3}{4}$  ft. l., 6-8 in. w. petiolate from 1-2 in. above the gibbous joint-like base, the apex merely pinnatifid and passing into the crenate obtuse point, those of the outer part of the frond also lax, petiolate, simply pinnate, passing into the lobed or sub-entire ones of the apex; rachis, costæ and costulæ bright glossy castaneous, naked, and the former faintly asperous beneath, pubescent down the face; pinnulæ spreading, petiolate, the lower ones, to  $\frac{1}{4}$  in. l., the base broadest and truncate, tapering thence to the crenate-serrulate sub-acuminate point, 3-4 in. l.,  $\frac{3}{4}$  nearly 1 in. w., pinnatifid nearly to the costulæ within but less deeply outwards; segments broadest at the base, rounded at the point, 4-5 li. l., 2-3 li. w., the margin crenate and reflexed; veins 6-7 to a side, simple or forked at the apices; sori large, forming an intra-marginal row, against which the margin is reflexed; receptacles elevated, densely tomentose; involucre small sepal-like, interior, simple or bilobed dark brown.—*Alsophila*, Baker in Trans. Linn. Soc. ser. 2 Bot. II., 288.

Guiana, Im Thurn No. 87, gathered at the base of Roraima. In cutting it resembles *Alsophila præcineta* of Brazil. In his field note Im Thurn says "very long, pendulous, lax, fronds, the top part of which, as often even the whole frond, is depauperated." This means that the top part of the frond, and sometimes the whole, is only bi-pinnate. The involucre I find very distinct and clear, when the sporangia are removed. It is well marked by its lax habit, very coriaceous substance, dark light colour, petioled pinnæ and pinnulæ, and large sori, which from a continuous line just within the reflexed margin, that often more or less covers it. In the smaller pinnæ, and the outer part of the larger, the costæ are slightly margined down the face. The substance is quite opaque when dry. The petiolæ pinnæ and pinnulæ remind one of *Cyathea gracilis*, Gr., of Jamaica.

11. *H. Sherringii*, Jenm.—Stem reaching 10 ft. high, 3-4 in. diameter; stipites stout, 2- $2\frac{1}{2}$  ft. l. freely armed with short straight spines, dark chestnut, rusty furfuraceous, the upper side densely clothed with dark castaneous attenuated pale-edged scales; fronds ample, tripinnatifid, 5-6 ft. l.  $2\frac{1}{2}$ -3 ft. w., pellucid, subcoriaceous, bright green, pale beneath, naked except on the ribs which are pubescent; rachis stout, prickly at the base, muricate upwards, puberulous, rather scaly and furfuraceous in the axils; pinnæ

acuminate, petiolate,  $1\frac{1}{2}$ - $2\frac{1}{2}$  ft. l. 7-9 in. w.; pinnulæ contiguous, the outer and inner rather more apart, the inferior not quite sessile,  $3\frac{1}{2}$ -5 in. l. 1 in. or rather over w. the apex tapering to a serrate-acuminate point, deeply pinnatifid almost to the costules; segments 5-8 li. l. 2- $2\frac{1}{2}$  li. w., linear-oblong, subfalcate, rounded, the inner open with a rounded or acute sinus between; veins once forked from near the base, 7-9 to a side; sori inserted at the forking, forming a line against the midrib; receptacles densely ciliate; involucre shallow, circular, the thin margins entire, lobed or incised.—*Journ. Bot.* 1886, p. 266.

Jamaica, Rose Hill, in the Port Royal mountains, 4,000 ft., alt., collected by R. V. Sherring in 1886. A large species, nearest allied to *Wilsoni*, from which its more robust growth, more deeply and uniformly pinnatifid pinnulæ, all of which up to the pinnatifid top of the pinnæ are free at the base, and shallow, calyciform involucre distinguish it. The latter character shows a decided passage into *Cyathea* *H. calolepis*, Hk. of Cuba, C. Wright, n. 950, is a large compound species, with pale straw-coloured vestiture and white bullate scaly beneath.

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12. *H. trinitensis*, Jenm. n. sp.—Trunk and petioles not seen; fronds tripinnate, coriaceous, glabrous except on the costæ, costulæ and mid-ribs of the segments where a few minute ferrugineous scales occur, light-green, the costæ turning wood-brown in drying; pinnæ stipitate, the apex pinnatifid acuminate and serrato-dentate to the point,  $1-1\frac{1}{2}$  ft. l. 4-6 in. b.; pinnulæ contiguous, entirely sessile, acuminate and finely serrated to the tip, fully pinnate only at the base, above that pinnatifid almost to the ribs,  $2\frac{1}{4}$ -3 in. l., 6-8 li. w.; segments subfalcate,  $1-1\frac{1}{2}$  li. w., 3-4 li. l. close, toothed all round, the end sub-acute; veins once forked from near the base, the branches open; sori close to the mid-rib, at the forking of the veins; involucre rather large, membranous, cinnamon brown, not trilobed; receptacle prominent, globose.

Trinidad.—A well marked very distinct species, easily recognised from any other here included by the deep regular tothing of the segments. The receptacles are very prominent, globose, many appearing when shrunk at the base as if capitate, and the involucre decidedly large. Its nearest ally is *H. Hartii*, Baker of *Chiriqui*.

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13. *H. Hartii*, Baker.—Caudex erect, of varying height, and medium girth; stipites erecto-spreading, clothed at the base with large lanceolate-acuminate dark or wood-brown scales, prickly, channelled, dark, rather glossy, brown,  $1\frac{1}{2}$ -2 ft. l.; fronds ample, spreading,  $2\frac{1}{2}$ -3 ft. w. reduced at the base, tripinnatifid, rather light-green, glabrous, rachis and costæ wood-brown; pinnæ  $1\frac{1}{4}$ - $1\frac{1}{2}$  ft. l., 4-5 in. w., erecto-spreading, sessile, lobate-acuminate, pinnulæ close in the inferior half, apart in the superior, all sessile, and shortly serrate-acuminate,  $2\frac{1}{2}$ -3 in. l.,  $\frac{3}{4}$  in. w. or less, cut nearly to the base into close subfalcate, oblong, rounded, conspicuously crenate segments, 4-5 li. l.,  $1\frac{1}{2}$ -2 li. w. with a sharp but slightly open sinus between; veins once forked midway; sori globose, medial, situated at the forking of the veins; involucre interior, cucullate cinnamon-brown, ample, half embracing the sori.—*Journ. Bot.* 1886, p. 243.

Chiriqui lagoon. Gathered by Hart in 1886. A very pretty, interesting plant that would make a fine feature in cultivation. As mentioned, its nearest ally is our No. 12.

14. *H. Leprieurii*, Jenm. n. sp.—Fronds ample, tripinnatifid, chartaceous, pale-green, glabrous; pinnæ spreading lower petiolate upper sessile, 2-2½ ft. l. 5-9 in. w., the apex acuminate and bidentate-serrate; rachis and costæ light-brown or stramineous, slightly muricate below, and pale pubescent above, as are also the costules; pinnulæ 2½-5 in. l. ½-1 in. w., sessile or the inferior ones of the lower pinnæ hardly so, oblong or linear-lanceolate, acuminate and bidentate-serrate at the apex, within this deeply pinnatifid to a li. or ½ li. of the costules; segments oblong, close, rather oblique and more curved than straight, ¼-½ in. l. 1½-3 li. w., rounded, the edges serrate, or, in the larger inferior ones, bidentate-serrate, the sinuses usually sharp; veins once forked (twice in the larger inferior pinnæ) above the middle or near the margin, but simple in the upper pinnæ, rather open, 5-8 to a side; sori small situated at the forking of the veins; sporangia few; involucre simple or lobed, relatively large to the sori which it clasps at first or quite hoods over on the inner side; receptacle slightly scaly.

Guiana; gathered by LePrieur in Cayenne. This is a very distinct species from *multiflora*, but my specimens which are unnumbered show neither petioles or rachis. These are probably pale-brown or straw coloured, and prickly, as the larger of the costæ show distant small warts, into which the prickles usually pass on these parts in tree ferns. The sori are very small and ascend nearly or quite to the top of the segment, are nearer the edge than mid-rib, and (in my specimens, and possibly due to immaturity of the sori) the involucre are hooded over the inner side of the top, like a half-closed hand. The dentation (or bi-dentation in the larger) of the lobes is quite conspicuous and extends down the sides to the sinus as well as round the top of the segments. The surface is quite naked and the colour very light.

15. *H. multiflora*, R. Br.—Caudex several ft. h., 2-3 in. diameter, densely clothed at the apex with castaneous scales; stipites erecto-spreading, 1½-2½ ft. l., castaneous, channelled, freely armed, and clothed throughout with linear-acuminate dark chesnut scales; fronds ample, erecto-spreading, bipinnatifid, chartaceous, light-green or glaucous beneath, dark green above, naked or puberulous, with a few slight scales on the costules beneath; pinnæ erecto-spreading, 1½ ft. l., 6-8 in. w., petiolate, acuminate; pinnulæ copious, spreading, 3-4 in. l., ¾-1 in. w., sessile, or the inner ones shortly stipitate, and with an obtuse-acuminate, entire point; pinnatifid to within a line of the costæ; segments close, oblong rounded, rather curved, 2-2½ li. w., 4-6 li. l. from the costulæ; margins even or crenate; veins 6-8 to a side, forked from about the middle; sori copious, medial, attached at the forking of the veins; involucre bilobed.—*H. guianensis*, *Hk.*, *H. Hostmanni*, *Hk.* and numerous other synonyms.

*a. var. H. Parkeri*, Hook.—Surfaces, especially the rachises and ribs, more or less pubescent.

*b. var. superba*, Jenm.—Fronds larger; pinnæ 2-2½ ft. l., 8-12 in. w., pinnulæ fully pinnate at the base, or not, the segments apart with nearly their own width between them, free, and rounded, at the base, the costules margined by a narrow wing; scales of the caudex and petioles much smaller and narrower.

Trinidad and Guiana.—A very common species in the countries where found, and exceedingly variable. The variations occur in the more or less glabrous or pubescent surfaces, the size and degree of cutting, and the paucity or abundance of sori, but in colour and general aspect there is a unity of likeness in all the

forms, so that the species can rarely in any of its states be mistaken. The type and var. *a* are equally common in Guiana, reaching low down toward the coast on all the rivers, but extending far into the sandstone region of the interior. *b*. is a magnificent plant, and the largest and most distant from the type of the varieties known to me. It was gathered on the banks of the Isoruru River, on the trackless way to Mt. Raywa,—the great escarpment of a weird Indian legend.—Brazil.

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## GENUS V.—*Cyathea*.

Sori hive-shaped, or subglobose, on the backs of the veins; receptacles elevated and conical, generally setiferous, often cleft in two; sporangia copious, densely aggregated, obovate-cuneate; involucre of two forms: first, dimidiate, circumsessile and bowl-shaped, remaining entire after maturity; second, hemispherical, or entirely enveloping the sori at first, very thin, becoming at length much ruptured and broken down into irregular parts; caudex or trunk usually tree-like; fronds as a rule, ample: veins free.

The members of this genus have a wide range, from the valleys and slopes of the lower hills on the islands up to the highest elevations. Only one species is known in Guiana, and that from the higher ranges. In Jamaica they form the most striking feature of the mountain forest vegetation. The form of the involucre which in one section is like a sphere cut transversely, and in the other is hemispherical, but broken down eventually, divides the genus into two distinct groups. As a rule they are only found in moist cool forest regions.

*a*. Involucres cup or bowl-shaped, with even margin permanently entire.

*b*. Fronds bipinnate only.

1. *C. Nockii*, Jenm.
2. *C. pubescens*, Mett.

*bb*. Fronds tripinnatifid, or in part tripinnate.

3. *C. jamaicensis*, Jenm.
4. *C. arborea*, Smith.
5. *C. elegans*, Heward.
6. *C. nigrescens*, Jenm.
7. *C. concinna*, Jenm.
8. *C. Tussacii*, Desv.

*aa*. Involucres hemispherical—that is completely enveloping the sori at first, subsequently broken down irregularly; very fragile.

*b*. Fronds tripinnatifid, or in part tripinnate.

9. *C. insignis*, Eat.
10. *C. gracilis*, Griseb.
11. *C. dissoluta*, Baker.
12. *C. Schanschii*, Mart.
13. *C. furfuracea*, Baker.
14. *C. monstrabilis*, Jenm.
15. *C. vestita*, Mart.
16. *C. muricata*, Kaulf.
17. *C. tenera*, Griseb.
18. *C. caribæa*, Jenm.
19. *C. oyapoka*, Jenm.
20. *C. Purdiei*, Jenm.
21. *C. portoricensis*, Mett.
22. *C. Imrayana*, Hook.
23. *C. moniliforme*, Jenm.

*bb*. Cutting uncertain.

24. *C. conquisita*, Jenm.
25. *C. pendula*, Jenm.

1. *C. Nockii*, Jenm.—Stem less than 2 in. thick, only a few inches l. procumbent and rooting from the under side, corrugated; stipites tufted, few or several, erect, not prickly, rusty-tomentose beneath, above clothed with dark brown scales, the dwindling pinnae reaching to the base; fronds erect, spreading, plume-like, 2-4 ft. l. 5-10 in. w., subcoriaceous, dark-green, glossy, the under side pale; rachis subangular, channelled, rusty-puberulous, and fibrillose with small whitish-grey linear scales which extend to the costæ; pinnae spreading, 1-2 in. apart from rib to rib, sessile, fully pinnate, 3-6 in. l.  $\frac{3}{4}$ - $1\frac{1}{4}$  in. w., serrate-acuminate; segments slightly apart,  $\frac{1}{2}$ - $\frac{3}{4}$  in. l.  $1\frac{1}{2}$ -2 (or the basal 3) li. w., curved, the obliquely acute, and rather mucronate, apex serrate, the inner ones more or less rounded and free at the base, the basal pair largest and lobed or pinnatifid, the outer adnate; veins generally once forked from the base; sori inserted at the forking, close along the mid-rib, not reaching the apex; involucre cup-shaped rather pruinose, the margin often compressed; receptacles setiferous.—Journ. Bot. 1879, p. 257.

Jamaica, common on a limited area of the disintegrated acclivous forest slopes near Vinegar Hill, a short way below the Government Cinchona Plantations, 4,000-5,000 ft. alt., and less abundant just below Belle Vue, the site of the official residences, where Nock and I first found it in 1874-75. A singular species, distinguished locally by the caudex not being arborescent; and the small size of the fronds. The vestiture resembles somewhat that of *C. Tussacii*, but is much less dense. In the largest fronds the dwindling pinnae at the base become abortive, passing into linear filiform glands. Where exposed to the sun the fronds are not more than 2 ft. l., very coriaceous, the edges of the segments reflexed. The habit is that of a large *Nephrodium*. There is a frond in the Kew Herb., gathered by Wilson, the locality not marked.

2. *C. pubescens*, Mett.—Stem stout, reaching many ft. high, densely tessellated above, rather prickly; stipites stout and sharply armed, clothed with narrow chesnut scales, the reduced pinnae reaching nearly or quite to the base; fronds erect or erect-spreading, 6-8 ft. l.  $1\frac{1}{2}$ - $2\frac{1}{2}$  ft. w. base tapering apex rather acute than acuminate, very coriaceous, upper side crinkled, dull dark green, underneath pale and rather glaucous; rachis and costæ dark-brown, rusty-puberulous beneath, coated above with rusty adpressed tomentum; pinnae very numerous, close, horizontal  $\frac{3}{4}$ - $1\frac{1}{4}$  ft. l.  $1\frac{1}{2}$ - $1\frac{3}{4}$  in. w. serrate-acuminate, quite sessile, fully pinnate at the base only, but above this pinnatifid almost as deeply-segments  $\frac{3}{4}$  in. l.  $\frac{1}{3}$  in w. close, subfalcate, all but the inferior adnate, bluntish or acute, the margin crenate-serrate and subreflexed, ribs beneath fibrillose; veins evident, once forked from near the base, close; sori situated below the forking, small forming a continuous row close against the mid-rib reaching half or two-thirds up the segment; involucre cup-shaped, dark-brown; receptacles setiferous.

Jamaica, very generally abundant in forests of the slopes of the highest ridges and peaks of the main mountain ranges in the eastern parishes. A particularly fine plant, of a quite remote alliance as regards habit, and one of the two or three tallest Jamaica tree ferns, attaining a height of 40 ft. or more the shuttle cock-like dark head very often pushed through, and held clear above, the crown of the forest. The trunk is really about 6 or 8 in. in diameter, but occasionally becomes very stout (as much as one's extended arms can embrace) in the lower half or third by the abundant emission of aerial rootlets, which form

a matted coating, clothed in turn, ten or fifteen feet from the ground upwards, with *Trichomanes trichoides*, the glistening sheen of which seen through the dripping moisture is one of the most beautiful features of the forest of this high range.

3. *C. jamaicensis*, Jenm.—Stem tall reaching 12-14 feet high, smooth and naked below, scaly at the top; fronds ample, several ft. l.  $1\frac{1}{2}$ -2 ft. w. acuminate, tapering below, the reduced pinnæ extending to the base of the stipites, tripinnatifid, firm, naked but with a few minute scales on the costulæ and ribs beneath, the costæ pubescent above, puberulous beneath, rachis and costæ a light wood-brown; pinnæ spreading, sessile, acuminate,  $\frac{2}{3}$ -1 ft. l. 2-2 $\frac{1}{2}$  in. w. approximate; pinnulæ sessile, 1-1 $\frac{1}{2}$  in. l.  $\frac{1}{3}$  hardly  $\frac{1}{2}$  in. w. deeply pinnatifid, serrate-entire at the apex; lobes varying from deltoid to oblong, about 1 li. w. 1-2 li. l. from the mid-rib to the blunt or subacute point; veins simple or the basal once-forked, 3-5 to a side; sori close to the costulæ, situated at the base of the veins. one or two to each lobe; involucre thin, dark brown, small and shallow with the receptacles exserted above the entire rim.

Jamaica.—Wilson n. 686 in the Brit. Mus. Herb., John Smith's collection, gathered at Mansfield near Bath. It comes nearest the Cuban *C. balanocarpha*, Eaton, which has not so far been found in Jamaica, from which it differs by the pinnatifid pinnæ having less vestiture of leaf surfaces, and shallow saucer-like (rather than bowl-like) involucre, as in *C. arborea*. According to Wilson's note, the fronds are very long, with no clear petiole, or hardly any, the pinnæ dwindling to the base; and judging by the rachis, which is smooth and glabrous, they are probably nearly or quite unarmed. It may possibly present in the most developed state broader pinnulæ than Wilson's specimen shows.

4. *C. arborea*, Smith.—Stem reaching 30 ft. high, stout, the surface even and tessellated, clothed above with a dense coating of linear inch-long chaff-like scales; stipites articulate leaving a clear even-faced scar 1-1 $\frac{1}{2}$  ft. l., prickly or only scabrous with small warts; densely clothed with lanceolate pale chaff-coloured scales; fronds 6-8 ft. l., 3-4 ft. l. w., tripinnate, chartaceous, pale green, naked or with a few scattered minute deciduous whitish scales on the ribs beneath; costæ and costulæ slightly ciliate above; rachis stramineous or occasionally brown; pinnæ spreading, rather suddenly acuminate,  $1\frac{1}{2}$ -2 ft. l., 7-10 in. w. approximate in the outer part and sessile or subsessile, the lower more distant, the petioles gradually lengthening to 1-2 in. in the lowest reduced ones; pinnulæ close, all but the inferior sessile, 4 to 6 in l.,  $\frac{3}{4}$ -1 in w., fully pinnate at the base, above this pinnatifid almost to the costæ, the point finely attenuated and serrate; segments about  $\frac{1}{2}$  in l., 1-11 li. w., obtuse or acute, subfalcate, serrate throughout but more deeply along the sides, connected at the base, otherwise open between; veins once forked, pellucid; sori close to the rib, situated at the forking, ascending about two-thirds of both pinnules and segments: involucre brown, membranous, shallow and saucerlike, with a scaly setiferous, usually cleft, receptacle protruding.—*Filix arborescens*. Plum. Fil. t. 1 and 2 *Polypodium arboreum*, Linn. *C. Serra*, Willd. Hook Sp. Fil. vol. 1 t. ix.

West Indies generally.—Abounding in great profusion among the lower hills, and ascending to about 2,500 ft. alt.; gregarious, often covering acres on fully exposed slopes, everywhere, shunning shade. A most beautiful plant, forming a

conspicuous and delightful feature of the hill and wayside vegetation. The name was adopted from Plumier, whose figures, cited above, though somewhat artificial and exaggerated, no one acquainted with the plant in its wild state could for a moment mistake. But while these figures have been uniformly quoted by authors, the name has been long misapplied to other species. It is however so entirely appropriate in its original application—the plant forming unmixed groves, while the stems constitute the only wood used, or easily procurable, in certain districts as posts in the houses of the peasantry, no other species being applied to any such purpose—that it would be a pity not to restore it. In Jamaica the petioles are only slightly asperous, but from the French Islands to Grenada they are freely prickly.

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5. *C. elegans*, Heward.—Stem several feet, 3-4 in. thick, often prickly, the scars rough with protruding fibres; stipites 1-2 ft. l., dark brown, puberulous or scurfy, prickles scant and variable in size, scales scant, subulate, dark brown, confined to the inner side of the base; fronds ample, tripinnate, chartaceous or coriaceous, dark green, rachis and costæ puberulous beneath, costulæ and ribs slightly scaly there, and with the costæ rusty-tomentose above, all bright or dull brown, other parts naked; pinnæ approximate,  $1\frac{1}{2}$ - $2\frac{1}{2}$  ft. l., 5-9 in w., lower shortly petiolate; pinnulæ approximate, sessile, serrate-acuminate, 3- $4\frac{1}{2}$  in. l.,  $\frac{1}{2}$ -1 in. w., fully pinnate at the base, above this almost as deeply pinnatifid; segments close, sub-falcate, bluntish or acute, crenate-serrate,  $\frac{1}{4}$ - $\frac{1}{2}$  in. l., 1-2 li. w.: veins once or twice forked; sori attached close to the forking, against the midrib, ascending from the base two-thirds upwards; involucre deep, chestnut, thin.—Sloane's Hist. p. 95. t. 56. Herb. pp. 133, 134, *Polypodium speciosum*, Linn. *C. Grevilliana*, Mart., *C. arborea* var. *pallida*, Hook.

Jamaica, in forests among the lower hills, and ascending to 4,000 ft. alt. where it appears on banks and waysides exposed to the sun, and is sometimes in such open situations slightly contracted in the segments. This and *arborea* are the two lowland tree-ferns, and as the latter avoids shade, so this avoids exposure, creeping out however in the cool higher regions where the sun is less intense. The fronds in young plants are more or less persistent, and, in sheltered situations, often hang pendent, densely littering the trunk, till in course of time they decay and fall away. The rachis is asperous or prickly at the base, and there are usually a pair of abortive pinnæ near the base of the stipites, distant from the lowest normal pair.—Cuba.

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6. *C. nigrescens*, Jenm. (non Klotzsch).—Stem erect, several feet high, 3-4 in. thick, prickly, the scars rough with decaying fibres; stipites spreading, strong, 1- $1\frac{1}{2}$  ft. l., very prickly, dark, scurfy and somewhat scaly; fronds spreading, about 6 ft. l., 3-4 feet w., tripinnate, coriaceous and stiff, rigid when dry, dark green above, pale or glaucous beneath, costa and costulæ rusty-tomentose above, and, with the ribs naked or puberulous beneath, other surfaces naked; rachis very dark chestnut, or blackish, glossy but puberulous; pinnæ approximate,  $1\frac{1}{2}$ -2 ft. l., 6-8 in. w., stipitate or sessile, serrate-acuminate; pinnulæ approximate, sessile or the inferior shortly stipitate, the apex shortly acuminate and serrate-entire,  $2\frac{1}{2}$ -4 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. w., fully pinnate at the base, almost as deeply pinnatifid above this; segments close or the inferior open, slightly curved or not, obtuse or acute,  $\frac{1}{4}$ - $\frac{1}{2}$  in. l. or nearly so,  $1\frac{1}{2}$ -2 li. w.. the edge even and reflexed when dry; veins once forked from the base; sori at the forking, against the midrib

confined to the base or ascending half or two-thirds up the segment; involucre deep, pale or dark coloured, entire.—*C. arborea* var. *nigrescens*, Hook. *C. arborea*, Sm. in part.

Jamaica, frequent and widely scattered in both wooded and open situations from 2,500 or 3,000 ft. to 6,000 ft. alt. extending to the central and western parishes; common where found but not so abundant anywhere in numbers as some of the other species. The dead fronds generally hang about the trunk, from which they part slowly, leaving a rough surface. Its different colour—varying, however, in the vascular parts from dark brown to nearly black—rigid texture when dry, entire, even-edged segments and greater prickliness—the spines being particularly sharp—distinguish it from *elegans*, its nearest ally, with which, as a variety of “*arborea*,” it has hitherto been associated.—Cuba.

7. *C. concinna*, Jenm.—Stem very stout, 6-8 in. diameter, rough-surfaced, reaching 15 ft. high; stipites stout, armed, puberulus-furfuraceous, and sparsely clothed with dark scales at the base; fronds ample, spreading, bi-tripinnatifid, sub-coriaceous, dark green above, pale or glaucescent beneath; rachis, costæ and costulæ light or dark brown, pubescent above, beneath puberulous, costulæ and ribs slightly ciliate beneath and sprinkled with minute pale deciduous bullate scales; pinnae alternate,  $1\frac{1}{4}$ - $1\frac{1}{2}$  ft. l.,  $2\frac{1}{2}$ - $3\frac{1}{2}$  in. w., sessile, acuminate; pinnulæ quite sessile,  $1\frac{1}{2}$ -2 in. l., 2-4 li. w., with an entire or serrulate acuminate point, lobed or pinnatifid within  $\frac{1}{2}$ - $\frac{3}{4}$  to the costules, or the fertile contracted and lobate entire in the inner half or third immediately above the base which is usually normal; segments oblong or deltoid-oblong, acute, even-edged, about 1 li. w.,  $1\frac{1}{2}$ -2 li. l. from the base, the contracted ones rounded a li. or less each way, the edge often incurved over the sori; veins simple; sori forming usually a single row on each side of the costules; involucre cupshaped, delicate, entire. *C. arborea* var. *concinna*, Baker. *Journ. Bot.* 1881. 52.

Jamaica, common in forests, of the higher ranges between 5,000-7,000 ft. alt. gathered on the slopes of St. Catherine's peak, and below New Haven Gap, where it prevails in great abundance, and elsewhere in the Blue Mountain range. Though the pinnae and pinnulæ are of the same relatively reduced size, the characteristic contraction of the final segments is not constant if it occurs at all, in the sterile fronds. It differs from the two preceding by the much stouter and taller trunk, much narrower pinnae and pinnulæ, the latter often contracted and irregularly lobed, and the simple veins, only the basal of which in each segment are fertile. Like *Tussacii*, in the resting season, in late spring or toward mid-summer, it sometimes drops all its fronds, the large stout trunk, a uniform diameter from top to bottom, standing, post-like, till growth begins again. Mr. Baker has lately in the *Annals of Botany* referred this to *Jamaicensis*, but my memory and descriptive notes of it lead me to believe it distinct.

8. *C. Tussacii*, Desv.—Stem very stout, attaining 20-25 ft. high, prickly and rough with ragged scars; stipites stout; densely armed with strong curved sharp spines,  $1\frac{1}{2}$ - $3\frac{1}{2}$  ft. l., greyish-scurfy, clothed above with long attenuated very narrow rather fibrillose scales; fronds large, tripinnate, about 8 ft. l. and 4 ft. w., very coriaceous and rigid, dark dull green above, rather glaucous beneath, rachis stout, freely asperous and prickly beneath, and with the costæ, which are also asperous, grey fibrillose and scurfy; pinnae opposite or nearly so,  $1\frac{1}{2}$ -2 ft. l., 6-8 in. w., usually not quite sessile; pinnulæ close, sessile, serrate-acuminate, about 4 in. l. and  $\frac{5}{8}$  in. w., fully pinnate at the base, almost as deeply pinnatifid above, shortly acuminate; segments close, curved or subfalcate, acute or bluntish, about 5 li. l.,  $1$ - $1\frac{1}{2}$  li. w., the margins even and incurved when dry; veins once forked near



the base; sori at the forking of the one to three lower veins, close against the costules; involucre cupshaped, very thin and sometimes shrivelling.

var. *magnifolia*.—Fronds much larger, chartaceous, vestiture much less, pinnæ  $2\frac{1}{2}$  ft. l., 10 in. w., pinnulæ 5 in. l., 1 in. w., rather more tapering, deeply serrated at the apex; segments flatter, broader, subcrenulate in the outer part, pale grey beneath; veins once or twice forked; sori smaller, sparser, greyish.

Jamaica, very abundant in forests 4,000-6,000 ft. alt., chiefly in damp gloomy ravines. A large, very robust species, perhaps the most robust of all, of a grisly aspect, the large flatly spreading head of a dark dull colour. The coating of grey scurf gives the vascular parts the aspect of being powdered, over which are the grey scales, which vary in form in the different parts. This vestiture readily distinguishes it. In some instances, as mentioned under *concinna*, late in the resting season, about May or June, the fronds all drop away, leaving the bare trunk. When vegetation begins again, a whorl is thrown up together. The Cuban plant gathered by Eggers, Ap. 1889, n. 5171, referred to this species by Christ, does not belong here, it being distinctly tripinnate, the segments of a different form, the characteristic vestiture absent, and the involucre hemispherical at first, but bursting eventually uniformly into two distinct and very prominent lobes (bilabiate).

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9. *C. insignis*, Eat.—Stem stout, reaching 20 ft. or more high, densely clothed at the top with matted pale-brown very narrow scales; stipites spreading, stout, asperous but quite devoid of prickles, similarly clothed to the trunk; fronds forming a rather flat head, ample, tripinnate, 7-8 ft. l.,  $3\frac{1}{2}$ -4 ft. w., subcoriaceous, dark green above, glaucous beneath; rachis strong, somewhat scurfy-scaly, dark greyish brown; costæ slightly rusty tomentose above, deciduously scurfy beneath; costulæ and ribs beneath with minute stellated scales; surfaces otherwise naked; pinnæ approximate,  $1\frac{1}{2}$ - $2\frac{1}{2}$  ft. l., 6-8 in. w., nearly sessile, drooping at the ends; pinnulæ close, very numerous, sessile, acuminate, the point rather long and subentire or serrate, fully pinnate at the base, above this very deeply pinnatifid, 3-4 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. w.; segments curved or subfalcate, acute or obtuse, 4-6 li. l., 1- $1\frac{1}{2}$  li. w., even or crenulate-edged, the basal pair, which are usually enlarged, often lobed or pinnatifid, and overlapping the costæ; veins once or twice forked below the middle, pellucid; sori copious, inserted near the forking, reaching from the base to the top of the segment, and filling up the space between the midrib and recurved edges; involucre thin, glaucous, hemispherical, bursting irregularly from the top.—*C. princeps*, J. Smith.

Jamaica.—Plentiful in situations at 4,000-5,000 ft. alt. but not generally diffused, gathered on the slopes of St. Catherine's Peak and of Blue Mountain Peak and at several intervening places, where it is common and as a rule gregarious, growing both in shade and out. A particularly fine plant, the stem 6 in. thick, and well distinguished by the dense subulate vestiture, entire absence of prickles, thin hemispherical pruinose coloured involucre. Like the two preceding, it makes its growth periodically, throwing out a tier of fronds at once, and then resting for an interval.—Cuba.

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10. *C. gracilis*, Griseb.—Stem erect or decumbent,  $2\frac{1}{2}$ -3 in. thick, occasionally reaching 10 ft. high, clothed with the appressed persistent bases of past stipites; stipites erect, spreading 2- $2\frac{1}{2}$  ft. l., dark bright chestnut, slightly warty at the base, but quite unarmed, and densely

clothed with rather large ovate-acuminate scales of like chestnut colour; fronds relatively large, but slender and lax, 4-7 ft. l., 3-3½ ft. w., tripinnate chartaceous, dark green, naked; rachis and costæ dark bright brown, the latter and the costulæ rusty pubescent above, all otherwise naked; pinnæ lax, 1¼-2 ft. l. 5-10 in. w., truncate and petioled at the base, the petioles 1-2 in. l., apex serrate-acuminate; pinnulæ distant, truncate and petioled below, the point serrate-acuminate, 3-5½ in. l., 1-2 in. w., pinnate or only pinnatifid, the costæ very slender; segments flat, oblong, incised throughout, or (in the pinnate pinnulæ) lobed half way to the midrib, blunt or rounded ½-1¼ in. l., 2-4 li. w.; veins once to thrice forked; sori rather large, situated at the forking; involucre delicately thin, hemispherical, split to the base eventually into 3-5 sepal-like pieces, exposing the sporangia and the setiferous receptacle.—Gr. Fl. B. W. In. Is. p. 704.

Jamaica.—Very plentiful in sheltered situations in forest at 5,000-6,000 ft. alt. in the region of the Govt. Cinchona Plantation, where it is gregarious in slight valleys or depressions of the ground, growing in leaf mould. The stem is rather soft and fibrous outside from the decaying stipites and coating of aerial rootlets, the woody portion being only about 1½ inches in diameter. It is usually short, but reaches in occasional instances 10-12 ft. The root hold in the peaty soil is not very firm, so that the stems frequently fall and lie procumbent, though this does not much affect the growth. The pinnæ drop with age, the dead stick-like rachises of past, remaining with the present, fronds. The species is remarkable for its very lax habit, the parts being relatively broader, distant and conspicuously petioled.

11. *C. dissoluta*, Baker.—Stem 6-10 ft. high, 2½-3 in. thick, clothed above with chestnut scales; stipites spreading, castaneous, prickly and asperous, the spines short, straight and bluntish, densely paleaceous at the base like the stem; fronds tripinnate, 3-4½ ft. l., 1½-2 ft. or over w., chartaceous, dark green, rachis, costæ and costulæ castaneous, the two latter puberulous beneath and rusty pubescent above, the last having small chestnut rather bullate scales mixed with a few fibrils beneath which extend to the ribs and veins, other parts glabrous; pinnæ approximate, ¾-1¼ ft. l., 4-6 in. w., shortly petioled; pinnulæ near, 2-3 in. l., ½-¾ in. w., sessile or the lower barely stipitate, serrate-acuminate, fully pinnate at the base, almost as deeply pinnatifid above that; segments oblong, flat, somewhat curved, close; 4-5 li. l., 1½ li. w., blunt, serrulate throughout; veins generally once forked; sori at or just below the forking, near the rib, extending ½ or ⅔ up the segments; involucre chestnut brown, thin, hemispherical, breaking down irregularly to the base into spreading calyciform or not, lobes, exposing the setiferous receptacles.—Journ. Bot. 1881, p. 52.

Jamaica.—Infrequent in forests, sometimes associated and intermixed with *furfuracea* and *gracilis*, at 5,000-6,000 ft. alt., gathered a short way below Morce's Gap, at Portland Gap, and other situations of about the same elevation. I have said under that species that in cutting and form this and *Alsophila parvula* have a very close external resemblance. In addition to the generic character, they contrast however in the colour of their vascular parts and vestiture, *A. parvula* too having a much taller, more slender stem, and occupying a much lower range of altitude. The sori appear to be larger in the smaller specimens. When freshly gathered the substance is pellucid, with crowded minute grey dots on the underside.

12. *C. Schanschin*, Mart.—Stem reaching several feet high, about 3 in. thick, clothed with very dark castaneous scales at the top; stipites rather slender, castaneous or blackish, glossy, 1-1½ ft. l., freely armed with short straight spines and clothed at the base with scales like those of the stem; fronds spreading, tripinnatifid, 3½-5 ft. l., 2-2½ ft. w., chartaceous, dark green above, subglaucous beneath; rachis, costæ and costulæ rusty pubescent especially above, with similar minute scales scattered generally over both surfaces of the segments; pinnæ 1-1½ ft. l., 4-6 in. w., generally shortly petiolate; pinnulæ 2-3¼ in. l., ½ in. w., approximate or with half their own width between, shortly stipitate, deeply pinnatifid, or casually fully pinnate at the base, the point serrulate-acuminate; segments 3-4 li. l., 1½ li. w., oblong, blunt, hardly curved, finely serrulate, or subentire, a little expanded at the base, the lowest one being on the inferior side of the pinnulæ; veins pellucid, once forked above middle, or simple; sori small, situated at or below the forking, ascending ½-⅔ up the segment; involucre very thin, breaking down calyciform, revealing the small ciliate receptacles.

Jamaica.—Common on the highest slopes and peaks of the Blue Mountains, attaining the highest elevation in the country, higher than any other species of tree fern. On the slopes just under the Blue Mountain Peak it is common, but ascends though somewhat reduced in size, to the summit. The slightly pedicellate pinnulæ, rather zigzag costæ glaucous underside and ciliate surfaces well mark the species from those near it. The stipites and trunk are peculiarly dark, and look almost black in the forest. At first the sporangia show clearly through the delicately thin involucre.—Venezuela to Brazil and Peru.

13. *C. furfuracea*, Baker.—Stem reaching several ft. high, 2½-3 in. thick, even surfaced, the scars small and close, freely clothed at the top with ferruginous scales; stipites 1-1½ ft. l., erect-spreading, dark bright brown, the base densely clothed with scales like those of the stem, and freely armed with short bluntish spines; fronds drooping at the ends, 3¼-4½ ft. l., 2 ft. w. or over, chartaceous, dull green above, pale beneath, rachis asperous, brown rather rusty pubescent above; costæ slender, greyish pubescent above, slightly muricate beneath, with a few deciduous scattered linear lanceolate dark brown scales, which, reduced in size, extend to the costulæ and ribs, the two latter parts densely coated beneath with meal coloured, more or less bullate, and acuminate scales, the other surface on both sides, but chiefly the under, bearing small scattered greyish fibrils; pinnæ 1-1¼ ft. l., 3½-4 in. w., approximate, nearly sessile or shortly pedicellate, shortly acuminate; pinnulæ close, or with a slight space between, sessile, very deeply pinnatifid or the lower ones fully pinnate at their base, the apices shortly acuminate and serrulate, 3-3½ in. l., 6-7 li. w.; segments flat, close, barely curved, the point rounded and serrate, 3-4 li. l., 1½ li. w.; veins once forked from the middle, or simple; sori at or below the forking, ascending ½-⅔ up the segments; involucre fragile, hemispherical, breaking down irregularly calyciform.

Jamaica.—Very common in forests and on wayside banks from 4,000-6,000 ft. alt. The trunk is comparatively slender, but attains occasionally a height of 40 or more ft. and is sometimes, though but rarely, branched, bearing two or three heads. Its much taller trunk, copious meal-coloured vestiture of the costules

and ribs, few pale fibrils scattered over the dull surfaces, and brighter ferruginous scales of the crown distinguish it at sight from its allies. The belt at 5,000 ft. alt. seems to be its chief habitat, though it extends equally, in diminishing quantity, both above and below that line.

14. *C. monstrabella*, Jenm.—Stem 2-3 in. thick, reaching 4 or more feet high, freely clothed at the top with castaneous scales; stipites 1-1 $\frac{3}{4}$  ft. l., chestnut brown at the base but straw coloured higher, densely armed throughout with short straight bluntish spines, and at the base clothed with linear-acuminate scales like those of the caudex; fronds spreading, 3-4 ft. l., 1 $\frac{1}{4}$ -1 $\frac{3}{4}$  ft. w., bitripinnate, chartaceous dark green above, sub-pruinose beneath, rachis prickly or asperous at the base, bright stramineous, pale pubescent down the face as are the costæ and costulæ, the costæ furnished beneath with small narrow scattered brownish scales, the costulæ with minute bullate like-coloured ones; pinnae subdistant nearly, or the upper, quite sessile,  $\frac{2}{3}$ -1 ft. l., 4-5 in. w., the apex lobate; pinnulæ with their own width between or subdistant, sessile, rounded and subentire at the base, 1 $\frac{1}{2}$ -2 $\frac{1}{2}$  in. l., 4-5 li. w., cut almost to the costulæ into close blunt rounded slightly crenate lobes, which are 2 li. w. and d.; veins flabellate or pinnate, the venules once or twice forked; sori situated at the forking, involucre hemispherical, very fragile, breaking down calyciform, exposing the setiferous receptacles.—Journ. Bot. 1881, p. 273.

Jamaica.—Infrequent near Portland Gap, 5,000-6,000 ft. alt. in forest, gathered twice by Nock, who describes it as having at a short distance the appearance of a *Marattia*. I hesitate equally to let it stand or remove it; it appears evidently to be an abnormal state, but whether of a known or otherwise unknown species I am unable to decide. Difference in colour and vestiture makes me hesitate in referring it to either *Schanschin* or *furfuracea*, to which species it is most closely allied. There is a tendency to tasseling in the fronds, for the upper pinnae are forked from the base, the divisions being of equal length, a tendency that is also exhibited on the superior side by some of the lowest pinnulæ. These are often fully pinnate, and the segments oblong, characteristics no doubt of the normal state, of which I have lately received a barren frond.

15. *C. vestita*, Mart.—Caudex 20-30 ft. high; stipes 1 $\frac{1}{2}$ -2 ft. l., strong, clothed abundantly at the base with linear attenuated, castaneous scales, muricate, and beset with short prickles, dark brown glossy; fronds ample, tri-pinnatifid, pubescent, especially beneath, and glandulose, chartaceous, light green above, subpruinose beneath; pinnae alternate, oblong-lanceolate, sessile or shortly stipitate, with a scar at the base beneath, 10-16 in. l., 4-6 in. w., the acuminate apex pinnatifid to the end; pinnulæ sessile, 2 $\frac{1}{2}$ -3 in. l.,  $\frac{1}{2}$ - $\frac{2}{3}$  in. w., rather shortly passing at the end into a serrulate point, pinnatifid almost to the costæ; segments linear-oblong, subfalcate, 4-5 li. l., 1 li. w., slightly crenate in the outer part; rachis, costæ and costulæ pale brown, and densely coated with a fine pale silky pubescence, the former rather muricate; veins forked; sori copious in the lower half or three-fourths of the pinnulæ; involucre breaking down to the base.—*C. hirsuta*, Mart. *C. abrupticaudata*, Fee, Fil. Brasil, p. 183, t. 62, fig. 2.

Guiana.—Base of Roraima. This a good deal resembles *C. furfuracea*, but the vestiture is quite different in character and most resembles that of *Alsophila armata*, and is of a soft silky fawn colour. The spines are usually short and blunt, under the scales at the base of the petioles are hardly more than warts.—Brazil and Columbia.

16. *C. muricata*, Kaulf. (non Willd).—Petioles muricate, scabrous, paleaceous; fronds ample, tripinnate, light green, subcoriaceous, naked except on the ribs above which are freely tomentose, beneath naked; rachises brown or substramineous, muricate or scabrous; pinnæ spreading, oblong-lanceolate, acuminate,  $1\frac{1}{2}$ -2 ft. l., 6-8 in. br.; pinnulæ numerous, spreading, sessile, oblong lanceolate, acuminate, 3-4 in. l.,  $\frac{3}{4}$ -1 in. br., fully pinnate at the base, above this deeply pinnatifid; segments close, ligulate, flat,  $1\frac{1}{2}$ -2 li. br., crenate or more deeply lobulate; veins 8-9 to a side, forked or the inferior fascicled or pinnate; sori near the forking; involucre fragile, membranous.—Hooker and Baker, syn. Fil. p. 450, 2nd Ed.

Grenada.—Gathered by Elliott. Mr. Baker says.—“Willdenow’s plant of this name is founded on a figure of Plumier, which cannot be safely determined.” This I have not seen and have taken the description from Baker. Plumier’s fig. is n. 4, the murication of the rachis and costæ being apparently artificial. The pinnulæ are about  $2\frac{1}{2}$  in. l.  $\frac{3}{4}$  in. w., without sori or vestiture and quite sessile. Grisebach has muddled the plants of Willdenow and Kaulfuss together under these two authorities.—Martinique.

17. *C. tenera*, Griseb.—Caudex erect, unarmed; fronds ample, tripinnatifid, chartaceous, pale green, naked or slightly ciliate on the ribs beneath; rachis and costæ pale brown, naked, glossy; pinnæ a foot or more l., 4-5 in. w., pinnulæ  $2\frac{1}{2}$ -3 in. l.,  $\frac{1}{2}$  in. or more w., pinnatifid nearly to the costules, shortly serrate-acuminate; segments flat, obtuse, linear-oblong, 1 li. or over w., slightly falcate, serrulate; veins 6-7 to a side, forked; sori attached at the point of forking of the veins; involucre at length breaking down.—Gr. Fl. B. W. I. I. p. 704.

St. Vincent.—Collected by Cealey. This I have not seen, and have taken the description from Hooker’s and Grisebach’s descriptions of it. In regard to the shape of the involucre, these authors leave it uncertain as to whether they are cup-shaped or hemispherical, but as they speak of their being “irregular” and “broken down,” I infer the latter, as the former are invariably entire with an even rim. From the descriptions, it does not seem to be very different from *C. caribæa*, Jenm.

18. *C. caribæa*, Jenm. n. sp.—Trunk not seen; petioles not seen; fronds spreading, ample, unarmed, tripinnatifid, 6-8 ft. l., 3-4 ft. w., coriaceous, naked except on the costæ, costulæ and ribs which are pubescent, dark green above, glaucous beneath; pinnæ spreading,  $1\frac{1}{2}$ -2 ft. l., 6-7 in. w., sessile with a scar at the base beneath, the apex serrate-acuminate, rachis and costæ dark castaneous; pinnulæ very numerous, contiguous but not touching, deeply pinnatifid almost to the axis, sessile, serrate-acuminate, 3-3 $\frac{1}{2}$  in. l.,  $\frac{1}{2}$  in. w.; segments numerous, close, slightly curved, obtuse or rounded, even-edged or jointly crenate,  $\frac{1}{4}$  in. l.,  $1\frac{1}{2}$  li. w., slightly dilated at the base; veins once forked from near the base, sori attached at the fork, confined to the inferior veins and so forming a simple line on each side of the costules; involucre hemispherical, at length bursting at the top, then collapsing, having shed the sporangia.

St. Vincent.—Probably not endemic, but no specimens have yet appeared from any of the other islands. Grisebach referred it to *C. Tussacii*, Desv., to which it is still referred, but from which, apart from its very different general features, it is definitely separated by the hemispherical involucre.

19. *C. oyapoka*, Jenm. n. sp.—Trunk and petioles not seen; fronds ample, spreading, tripinnatifid, 6-8 or 10 ft. l.,  $3\frac{1}{2}$ - $4\frac{1}{2}$  ft. w., thinly coriaceous, very dark green and glossy above, very pale beneath, devoid of vestiture except on the costæ and costulæ which are freely furfuraceous above, the former of which are slender, glossy, ebeneous, and somewhat quadrate; pinnæ very ample but slender, 2- $2\frac{1}{2}$  ft. l., 6-8 in. w., spreading horizontally, sessile, the apex pinnatifid, acuminate and serrate-entire; pinnulæ copious apart, horizontal sessile, serrate-acuminate, deeply pinnatifid, 4 in. l., 10 li. w., the costulæ slightly flexuose, final segments 5 li. l., 2 li. w., broadly aduate, with an open sinus, curved somewhat, obtuse but not rounded, the margins entire and even or crenate toward the base; veins once forked almost from the base; sori attached at the fork, dark brown, confined to the base or ascending half way up the segment; involucre thin, deeply cup shaped, with even unbroken edge, dark castaneous, the two rows touching each other over the midrib; receptacles elevated.

Cayenne.—Collected by Leprieur “in sylvis humidis ad torrentes Guyanæ centralis Oyapok superior Junio 1833.” The specimens were distributed by M. Cosson unnamed, and at home are referred to “*C. arborea*” (non Smith), my *C. nigrescens* of Jamaica, from which they are particularly distinct. In general aspect it resembles Purdiei, but differs in its more slender vascular parts and the form of the involucre. In spread of frond it is one of the largest and most striking and beautiful species. Apparently it is unarmed, the rachis being warty where the scales have dropped.

20. *C. Purdiei*, Jenm. n. sp.—Trunk very stout, erect, tall; stipites very stout, castaneous, curved, spreading, clothed with criniferous castaneous scales, quite unarmed; fronds very large, spreading tripinnatifid, 8-10 ft. l., 4-5 ft. w., coriaceous, dark sombre green above, glaucous beneath, the vascular parts castaneous and criniferous or eventually naked, and bright glossy; rachis very stout, an inch or over thick, criniferous at first, finally naked, without prickles, very faintly or microscopically asperous from the fallen vestiture, and a rich glowing chestnut colour throughout; pinnæ spreading, alternate, petiolate or sessile, with a conspicuous oval scar at the base beneath, the apex pinnatifid and acuminate; costæ like the rachis; pinnulæ spreading horizontally, alternate, quite sessile, 4-6 in. l.,  $\frac{3}{4}$  in. w., contiguous, serrate-acuminate, cut nearly to the costulæ into close, flat, slightly curved obtuse segments 5-6 li. l.,  $1\frac{1}{2}$  li. w., which are even-edged or faintly crenulate; veins forked near the base; sori in a single row close to the rib on each side, confined to the lower part of the segment; involucre fragile, hemispherical, finally ruptured irregularly.

Trinidad.—Gathered by Purdie, Sept. 6th, 1862, on the heights of Aripo, and not apparently by anyone since; a magnificent tree-fern, one of the very finest in the West Indies, where the tree-ferns are particularly fine, which I have failed during the past decade to discover has ever been described, and at home is referred to *C. arborea*, Smith, a species much misunderstood, which belongs to a different section of the genus, possessing saucer-shaped, permanently entire and even-edged involucre, while in this the involucre are hemispherical—that is they completely envelope the sori before maturity, then bursting and breaking down irregularly. I have seen *C. pubescens*, Mett., ascribed to Trinidad; this may be the plant meant.

21. *C. portoricensis*, Mett.—Stem and petioles not seen; fronds very large, 6-7 ft. l., 3-4 ft. w., rachis and costæ ebony-black, glossy, deciduously rusty furfuraceous, unarmed; pinnæ large, wide-spreading, chartaceous, dark green above, beneath paler and freely ciliate,  $1\frac{1}{2}$ -2 ft. l., gradually passing at the apex into a pinnatifid serrate-acuminate point; pinnulæ spreading horizontally, quite sessile, 4-4 $\frac{1}{2}$  in. l., 1 in. w., shortly serrate-acuminate, fully pinnate, the midribs finely scaly and hairy beneath and rusty villose on the upper side; segments 6-7 li. l., 1 $\frac{1}{2}$  li. w., slightly apart, a little curved, dilated somewhat at the base and fully aduate, the points rounded, the margins within roundly crenate, the crenatures slightly recurved; veins usually twice forked; sori copious, medial, at the forking of the veins, extending from the base of the segments but not quite reaching the apex; involucre at first hemispherical, bowl-shaped after bursting, freely hairy, receptacles elevated.

Porto Rico.—A very fine species, remarkable for its size, ebeneous rachises and costæ, large sori and freely hairy involucre. My specimens are identified by M. Kuhn who gives Mettenius as the authority, while Sprengel is given in the *Synopsis Filicum*.

22. *C. Imrayana*, Hook.—Caudex stout, erect, paleaceous and furfuraceous at the top; stipites stout, scaly at the base and dark rusty furfuraceous throughout, as are the rachis, costæ, costulæ and ribs throughout; fronds ample, wide-spreading, 8-9 ft. l., 4-4 $\frac{1}{2}$  ft. w., tripinnate, coriaceous, very dark sombre green above, dark brown beneath or rust-coloured; pinnæ ample,  $1\frac{1}{2}$ -2 ft. l., 6-10 in. w., sessile, the acuminate apex lobed and serrulate to the end; pinnulæ very numerous, close, sessile, spreading horizontally, opposite or alternate, 3-5 in. l.,  $\frac{3}{4}$  in. w., serrulate-acuminate, fully pinnate; segments curved, close, very numerous, aduate,  $\frac{3}{8}$ ths in. l.,  $1\frac{1}{4}$  li. w., the apex obtuse and faintly crenate, the ribs densely furfuraceous-scaly beneath, naked above; veins once forked from the base, close and numerous; sori situated at the base of the segment, close against the ribs; involucre fragile, dark reddish brown, hemispherical at first, then breaking down irregularly.—Hook. Sp. 1, t. 9. fig. B.

Dominica.—Hooker confounded the Jamaican *C. Tussaci*, Desv., with this, which has a quite different vestiture and uniformly cup-shaped involucre with even, unbroken rims. Hooker's figure shows clearly the hemispherical character of the involucre, and his description, where he says:—"The involucre is very fragile, and, when burst, extremely irregular, thin and membranaceous, never opening with the thin even margin of *C. arborea*," shows, further, its true character. I have ample material from Dominica, where Imray discovered it on the Couliaban mountain and it has often been gathered since, but have seen no specimens of it from any of the other islands, so that possibly it may be endemic.

23. *C. moniliforme*, Jenm. n. sp.—Caudex and stipe not seen; fronds ample, tripinnate 6-8 ft. l. or more, 4-5 ft. w., spreading and somewhat drooping dark green, glabrous except the costulæ on the upper side, subcoriaceous; rachis and costæ dull stramineous, abundantly asperous beneath with thickly diffused blunt minute warts; pinnæ ample, 2-2 $\frac{1}{2}$  ft. l., 8-10 in. w., tapering gradually into the pinnate serrate-acuminate apex, the base truncate, pinnulæ contiguous, sessile, or the inferior hardly so, spreading, pinnate from the base to the attenuated serrate-acuminate apex, 5-6 in. l., 1-1 $\frac{1}{4}$  in. w.; segments sessile, somewhat contracted then slightly dilated free and hastate-cordate at the base

open with their own width between, 6-8 li. l.,  $1\frac{1}{2}$ -2 li. w., obtuse-acute, curved, margins throughout cut deeply into somewhat irregular very small rounded scallop-shaped lobules, with recurved edges, each, from base to apex of the segments, containing a single vein and sorus; involucre hemispherical, fragile, finally breaking up irregularly.

Trinidad Herbarium.—Locality and collector unknown; a remarkably fine species, after the character and habit of *C. arborea*, Smith, but well distinguished by the conspicuously characteristic bead-edged segments and the complete hemispherical involucre, which break up into copious peelings finally.

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24. *C. conquisita*, Jenm.—Stem reaching several ft. high, stout, paleaceous above; fronds erect, spreading, 5-6 ft. l., dark dull green above, beneath greyish, coriaceous, naked generally but with a few minute scales scattered on the ribs of the underside, both rachises and costæ castaneous and clothed above with a richly tinted chestnut pubescence; pinnae approximate, 6-8 in. l.,  $1-1\frac{1}{4}$  in. w., quite sessile, acuminate, fully pinnate at the base; segments linear-oblong, rounded at the apex and finely serrulate  $\frac{3}{4}$  in. l., 2 li. w., spreading horizontally (not curved) in the lower half of the pinnae where they are constricted at the base and open, with half their own width between, those above slightly dilated and connected with a sharp sinus between; veins once forked, the line of sori on each side rather nearer the midrib than margin; involucre thin and fragile, breaking down irregularly calyciform.

Wilson, n. 134, in J. Smith's ferns, Herb. Brit. Museum. Wilson's label says:—"A large growing tree fern, fronds nearly upright, and five or six feet long, stem large, quite a tree. Very different from n. 16." Number 16 is the following species here given, with which this has near affinity, but is distinguished by the open space that occurs between the segments at their base, whereby the inferior ones are isolated. The segments are also flatter, and the lines of sori and the veins show distinctly on the upper side.

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25. *C. pendula*, Jenm.—Stem reaching several feet high, rather slender, scaly at the top; fronds pendent—spreading, coriaceous, dull dark green above, beneath glaucous, rachis channelled, and with the costæ clothed above with a bright castaneous pubescence, glabrous or slightly puberulous beneath, surfaces elsewhere naked; pinnae sessile, 6-9 in. l.,  $1-1\frac{1}{4}$  in. w., deeply pinnatifid or at the base fully pinnate; segments 6-8 li. l.,  $1\frac{1}{2}$ -2 li. w., rounded and serrulate at the apex, slightly dilated at the connected base, the sinus between being narrow and sharp; veins once forked; sori situated at the forking, forming a line near the midrib; involucre thin and fragile, castaneous, breaking down calyciform.

Wilson n. 16, J. Smith's ferns, Brit. Mus. Herb. No locality is given on the label, which says:—"A tree fern, 8-10 ft. high, stem about the size of a man's wrist or smaller, fronds at the top only, which hang all round, hence its creole name, "Parasol Fern, and very different from 134." This and the preceding are only known from Wilson's specimens in the British Museum, which are insufficient to show whether they are simply bipinnate or tripinnate species, the former of which is inferred in the foregoing descriptions from the fact of the rachises being channelled. They require to be compared with *Hemitelia Sherringii*, with which, speaking from memory of the specimens, their alliance seems to be.



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 TRIBE III.—*Woodsia*.
 

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SPORANGIA globose, stipitate, girt with an incomplete vertical ring; sori small, roundish or oblong, on the under surface of the fronds; involucre arising from beneath the sori, complete, calyciform, the margins fimbriated or regularly fringed; receptacles punctiform, superficial; fronds variable, small or medium sized; veins free or anastomosing.

This is a small tribe comprising only two small genera—*Woodsia* and *Hypoderris*. The former, which is the chief representative, and numbers about 15 species, is widely dispersed in northern arctic and temperate Europe, Asia, and tropical South America, South Africa, China and Japan. The latter is confined to the West Indies and Nicaragua. The involucre are shallow, more or less fringed around the margin, arising from beneath the sori like a calyx, at first clasping the sori, but at length spreading out flat beneath.

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 GENUS VI.—*Hypoderris*, R. Br.
 

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SORI small, punctiform, varying from roundish to oblong, serial, or scattered on the back of the veins, over the under surface of the fronds; receptacles superficial; involucre complete, calyciform, arising from beneath the sori, at first clasping and completely enclosing it, thence becoming shallow and dish-like, and at length flat, the margin fimbriated; fronds herbaceous, tri-lobed or pinnatifid, veins anastomosing.

There are only two species in this genus, both confined to tropical America, and each with a very limited range. The second is native of Nicaragua.

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*H. Brownii*, J. Sm.—Rootstock creeping, rather fleshy,  $\frac{1}{4}$ – $\frac{1}{2}$  in. thick, densely clothed with small rather squarrose scales; stipites scattered, erect, 10–15 in. l., fleshy, clothed like the rootstock but less so; fronds erect or erecto-spreading 1–1 $\frac{1}{2}$  ft. l., half as w. or less, herbaceo-chartaceous, glabrous, except on the ribs beneath, dark green glossy above, varying from simple to trilobed, the basal pair of lobes much the smaller, all acuminate, central ovate-oblong, 10–15 in. l. 4–6 in. w., the margins even or sinuate; primary veins costaform, oblique, flexuose,  $\frac{1}{3}$ – $\frac{2}{3}$  in. apart, connected by a copious anastomosis of angular meshes; sori very copious, scattered between the primary veins, and contained within the meshes of the general venation; involucre at first enclosing the sori, later shallow and calyx-like, at length flat.—Hook. Ic. Pl. t. 675, 676. Gard. Fer. t. 24. *Woodsia*, Mett.

Trinidad and Grenada, gathered by all collectors. Grisebach thought this might be dimorphic state of *Aspidium trifoliatum* Sw., but there is not the least evidence of any such connection. The fronds, when not entire, are merely trilobed, not divided to the base, the rootstock spreads freely but not widely, and the general substance of the parts throughout is rather fleshy and herbaceous. The sori are at first white, but at length becomes brown. In the earlier stages they are quite enclosed by the very delicate involucre, through which they gradually extrude, the latter then closely circling their base, but becoming finally concealed beneath the mature sporangia.

TRIBE IV.—*Davalliæ*.

SORI MARGINAL, sub-marginal or medial, punctiform or transversely oblong; involucre attached interiorly, the margin of the frond often forming an exterior quasi-valve.

7. *Dicksonia*.—Sori terminal on the veins; involucre cup-shaped or bilabiate.
8. *Davallia*.—Sori terminal on the veins; involucre scale-like or pocket-shaped.
9. *Cystopteris*.—Sori on the back of the veins; involucre scale-like or hood-shaped.

GENUS VII.—*Dicksonia*, L'Herit.

SORI MARGINAL, globose or nearly so, on the summits of the veins; involucre interior, cup-shaped or bilabiate, the inner valve special, the outer formed of modified crenules of the margin, opening exteriorly, the lips closed or overlapping at first; veins free, forked; fronds decompose.

Where this and the next genus meet the line of distinction is not very clear, the border plants fitting as appropriately into one genus as the other. All the West Indian species have decompose, and, as a rule, large fronds.

- a. —Sori small, in axillary crenules of the final lobes; involucre cup-shaped, or sub-bilabiate, reflexed.
  1. *D. cicutaria*, Swartz.
  2. *D. dissecta*, Swartz.
  3. *D. rubiginosa*, Kaulf.
- aa. —Sori small, terminal, or in axillary crenules of the final lobes; involucre flat, as wide or wider than the leaf-segment.
  4. *D. anthriscifolia*, Kaulf.
  5. *D. antillense*, Jenm.
- aaa. —Sori large, terminal on the final lobes; involucre bivalved, the outer hooded and overlapping the inner.
  6. *D. conifolia*, Hook.
- aaaa. —Sori serial around the margins; valves of the involucre closed at first; many or all of the veinlets fertile.
  7. *D. Plumieri*, Hook.
  8. *D. adiantoides*, H.B.K.

1. *D. cicutaria*, Swartz.—Rootstock free-creeping, rusty-ciliate; stipites 3-4 ft. l. channeled, dark-brown, glossy; fronds quadri-pinnate and again pinnatifid, 3½-5 ft. l. nearly as w. at the base, chartaceous, glossy dark green, glabrous or beneath very slightly ciliate; pinnæ alternate, 1½-2½ ft. l. 10-15 in. w., petiolate, the basal ones generally the largest; pinnulæ alternate, serrate and finely acuminate at the point, stipitate, 4-7 in. l. 1-2 in. w. tertiary segments ½-1¼ in. l. ¼-½ in. w. rounded and toothed at the apex, within this deeply cut into 4-6 lobes to a side, the larger of which are again toothed, the largest of all being on the superior base and 1-3 li. l. by 1-2 li. br.;

veins forked; sori on a crenature in the sinuses of the lobes, one to each, or two or more to the largest basal lobe; involucre deep, cup-shaped,  $\frac{1}{4}$ – $\frac{1}{2}$  li. w. sharply reflexed. Plum. Fil. t. 31.

Var. *D. apiifolia*, Hooker—surfaces more naked and brighter; teeth of the margins deeper and sharper; involucre deeper and smaller. Hook., Sp. Fil. vol. 1. t. 26, C. *D. incisa*, Fee, Fil. Ant. t. 25, fig. 1.

General throughout the West Indies, common in open and lightly shaded places from 2,000–5,000 ft. alt., easily recognised from the rest by its bright colour. There are three or four states, all varying, which differ most in the size and cutting of the segments and size of the involucre. The var. *apiifolia* is about the minimum dimensions given above and is easily recognised by its naked very glossy surfaces, and deep, sharp, marginal teeth. The form with largest, and bluntly lobed segments occurs at usually high elevations and are referred often to *D. adiantoides*, H.B.K. *Patania*, Presl. *Denstædia*, Bernh., Moore.

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2. *D. dissecta*, Swartz.—Rootstock free-creeping, dull, puberulous; stipites  $1\frac{1}{2}$ –3 or 4 ft. l. channeled down the face and laterally, dirty dark coloured; fronds  $3\frac{1}{2}$ –5 ft. l., 3–4 ft. w., naked dull cloudy green, thin but firm, quadri-pinnate and again pinnatifid; pinnæ nearly or quite opposite,  $1\frac{1}{2}$ – $2\frac{1}{2}$  ft. l.,  $\frac{1}{2}$ –1 ft. w. sessile: pinnulæ numerous, 4–8 in. l., 1–2 in. w. sessile, the point acuminate and serrate; tertiary segments, approximate,  $\frac{1}{2}$ – $1\frac{1}{4}$  in. l., 2–5 li. br., rounded or blunted at the obtusely, rarely acutely, dentate, open, deeply pinnatifid, the lobes oblong and 3–7 to a side, the lowest on the superior side largest and  $1\frac{1}{2}$ –3 li. l., by 1– $1\frac{1}{2}$  li. w., those above half the size, even-margined or their outer part faintly dentate: veins forked; sori one to each lobe in a crenature near the base, the larger basal lobe having two or more; involucre shallow, cup-shaped, or at first two-lipped, the inner valve being at length concealed under the expanded rotund sorus. Plum, Fil. t. 30. *D. adiantoides*, W., *D. cicutarioides*, Fee, Fil. Ant. t. 2., fig. 2. *Patania*, Presl., *Denstædia*, Bernh. Moore.

Common over the same regions as the preceding species at the same altitudes, always in damp dripping situations. Mature plants, especially at the higher elevations, bear bulbils in the axils of the pinnæ. Near the preceding, and presenting as many forms, but distinguished by the sessile pinnæ, dull cloudy colour, as a rule blunter segments, and more shallow involucre. One of the forms from the higher elevations over the whole range has minute sori, and is as finely cut as the var. *apiifolia*, of the preceding species, the pinnæ of which look like lace-work when mounted on paper. Cuba to Brasil and Peru.

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3. *D. rubiginosa*, Kaulf.—Rootstock wide-creeping; stipites scattered, 2–3 or more ft. l. slightly asperous, faintly channeled, glabrescent; fronds 3–4 ft. l.  $2\frac{1}{2}$ –3 ft. w. quadripinnate and again pinnatifid, light green, chartaceous, more or less ciliate or villose; pinnæ  $1\frac{1}{2}$ – $1\frac{3}{4}$  ft. l. 6–10 in. w., alternate, nearly sessile; pinnulæ numerous, approximate or close, nearly sessile, serrate-acuminate, 3–5 in. l.  $\frac{3}{4}$ – $1\frac{1}{4}$  in. w.; tertiary segments close, blunt or rounded and toothed at the end, 4–8 li. l. 2–4 li. w., deeply cut into blunt crenate-dentate lobes which are 1– $2\frac{1}{2}$  li. l.  $\frac{1}{2}$ – $1\frac{1}{2}$  li. br. the lowest on the superior side largest; veins forked; sori copious, minute, borne chiefly on the lowest crenature on the outside of the final lobes, or

on both sides of the larger inferior ones; involucre cup-shaped or sub-bilabiate.—Hook. Sp. Fil. Vol. 1. t. 27. A.

General throughout the West Indies. Common on open banks and waysides, and under light shade, from the lowlands up to 4,000 or 5,000 ft. alt. The vestiture is chiefly confined to the vascular parts. The texture though thin is firm, and feels harsh to the hand. In shade it reaches 10–12 feet high. A particularly well marked species with hardly any variation over its vast range.—Mexico to Brazil and Peru, and ascribed also to Bourbon and Mauritius.

4. *D. anthriscifolia*, Kaulf.—Rootstock, strong, creeping; stipites scattered,  $1\frac{1}{2}$ – $2\frac{1}{2}$  ft. l. channelled, wood—or straw-coloured, naked; fronds 2–3 ft. l.  $1\frac{1}{2}$ –2 ft. w., thin, dull green, naked, except the ribs which are slightly ciliate, quadripinnatifid; pinnæ nearly opposite, or quite so above,  $1-1\frac{1}{2}$  ft. l. 4–6 in. w. nearly sessile, the lower pairs apart; pinnulæ approximate, sessile, acuminate,  $2-3\frac{1}{2}$  in. l.  $\frac{3}{4}$  in. w.; tertiary segments  $\frac{1}{3}$ – $\frac{1}{2}$  in. l. 2–3 li. w., the rounded apex toothed, below this cut on both sides into 3–5 short dentate oblong lobes which are 1–3 li. l.  $\frac{1}{2}$ – $1\frac{1}{2}$  li. w., veins forked; sori small, in the crenatures, or terminal on the final lobes; involucre bilabiate, at length cystiform. Hook. Sp. Fil. vol. I. t. 27. B.

Cuba, Jamaica, Porto Rico. Common in open places on the banks of streams at high elevations. In general aspect near the last species, but less robust, with terminal sori, transversely flat, compressed involucre prior to their opening out, and flattened (appearing as if margined) costules. I have only seen specimens from the countries named, but the same range as the preceding species is ascribed to it.

5. *D. antillensis*, Jenm.—Rootstock creeping; stipites 2– $2\frac{1}{2}$  ft. l. bright brown, naked, channelled; fronds 3– $4\frac{1}{2}$  ft. l. naked, thin, pellucid, bright glossy dark green, quadripinnate and again pinnatifid; pinnæ opposite or nearly so, sessile,  $1-1\frac{1}{2}$  ft. l. 6–8 in. w.; pinnulæ sessile,  $1\frac{1}{2}$ – $3\frac{1}{2}$  in. l.  $\frac{3}{4}$ –1½ in. w. lobed to the acuminate point; tertiary divisions the same shape but proportionately reduced, fully pinnate; quaternary cut into lobes  $\frac{1}{4}$ – $\frac{1}{3}$  li. w. which when barren are sharply pointed, and the larger emarginate; veins simple in the final lobes; sori terminal on most or all lobes; involucre bivalved, compressed, wider than the lobe.—Journ. Bot. 1886, p. 267.

Jamaica.—Slopes of Blue Mountain Peak 7,000 ft. alt. It has the general outline and colour of *cicutaria*, but is much more finely cut than any form of that, and differs entirely by the terminal sori, and compressed involucre which are wider than the lobes. The cutting is as fine as in *Davallia fumarioides* and *Gymnogramme schizophylla*. In the character of the involucre, this and *anthriscifolia* do not differ from some conditions of *Davallia*, and might quite as appropriately be placed in that genus. It was discovered several years ago by Mr. Morris and later by Mr. Sherring, by both in the same region.

6. *D. conifolia*, Hook.—Rootstock stout, a few in. l. oblique, densely clothed with ferruginous wool-like scales; stipites tufted,  $1-1\frac{1}{2}$  ft. l. laxly spinescent in parallel rows down the sides, as is also the rachis, castaneous, the base clothed like the rootstock; fronds subcoriaceous, light clear green, naked except on the rachis, &c., deltoid or ovate-deltoid, 1–2 ft. l.  $\frac{3}{4}$ – $1\frac{1}{2}$  ft. w. quadripinnate, the several divisions proportionately reduced but much the same shape as the frond; lowest pair of pinnæ, pinnulæ, &c., the largest, final segments ovate, 2–6 li. l.  $1\frac{1}{2}$ –4 li. w. lobed or pinnatifid at the base,

above this dentate, the teeth acute and about  $\frac{1}{2}$  li. w.; veins forked; sori large, on one or both sides of the final lobes; involucre coriaceous the outer valve hooded over the inner, 1 li. w.  $\frac{1}{2}$  li. d.—Hook. Sp. Fil. vol. 1, t. 24. A.

Jamaica.—Very common, often forming large patches, in places in forests of the higher slopes and peaks between 6,000—7,000 ft. alt. An interesting and beautiful plant, very near *D. culcita*, L'Herit. of Madeira and Azores. The stipites are permanently adherent to the rootstock, and hence the dead fronds remain attached till, in the course of time, they decay away. The lowest pair of pinnæ are barren. On the mainland at like elevations from Columbia to Brazil.

7. *D. Plumieri*, Hook.—Rootstock stout, oblique; stipites tufted, strong, channelled, dark brown, 2—4 ft. l. the base slightly scaly; fronds  $2\frac{1}{2}$ —4 ft. l. nearly as wide, light green, paler beneath, sub-coriaceous, naked, tripinnate; pinnæ alternate, sub-distant, 1—2 ft. l.  $\frac{1}{2}$ — $1\frac{1}{4}$  ft. w., serrate-acuminate, petioled, lowest pair largest; pinnulæ sub-distant, alternate, the upper ones adherent and decurrent, the lower petiolate, serrate-acuminate, deeply pinnatifid or fully pinnate at the base, 4—8 in. l. 1—3 in. w.; tertiary segments variable, some rounded, others acute or acuminate, the larger 1—2 in. l.  $\frac{1}{4}$ — $\frac{1}{2}$  in. w., serrulate or lobate-serrulate; veins simple or forked; sori copious around the margins, close; involucre valves sub-equal, the lips shallow. Plum. Fil. t. 7. *Davallia adiantoides*, Swartz. *Cibotium*, Presl. *Saccoloma adiantoides*, Mett. *Dicksonia Lindeni*, Hk. Sp. 1. t. 25. B. *Eggersii*, Prantl.

Jamaica and Dominica. Common in moist forests from 2,000—4,000 ft. alt. A very robust plant, marked by the stout suberect rootstock, frequently a foot long and several inches thick, and the unequal final segments, some of which are rounded and others longer and pointed on the same pinnules. When open the involucre are pocket-shaped. It has an equal claim to be placed in *Davallia* in which case Swartz's name should be used. I have only seen specimens from the islands named, but probably it is generally spread through Cuba, San Domingo, Porto Rico and Columbia.

8. *D. obtusifolia*, Willd.—Rootstock stout,  $1\frac{1}{2}$ —2 ft. l. naked; stipites naked or slightly ciliate, channelled,  $1\frac{1}{2}$ —3 ft. l.; fronds 3—4 ft. l. nearly as w., tri-pinnatifid, bright green, paler beneath, chartaceous, naked; pinnæ opposite or nearly so,  $\frac{3}{4}$ — $1\frac{1}{2}$  ft. l. 5—9 in. w., the lower ones shortly petiolate; pinnulæ spreading, apart, sessile or the lower shortly stipitate, upper ones adnate-decurrent, basal pair greatly reduced, serrulate—acuminate at the apex, 4—6 in. l. 1—2 in. w., cut more or less deeply into close, crenate, broadly rounded lobes which are 3—4 li. w., and less or more deep; veins simple or forked; sori contiguous, serial around the lobes; involucre wider than deep, at first two-lipped, finally open and more or less cup-shaped.—*D. Pavoni*, Hook, Sp. Fil. I. t. 26, fig. A. *Davallia arborescens*, Willd. Plum. Fil. tab. 6.

Jamaica.—Infrequent in gullies near the highest peaks at 7,000 ft. alt., gathered both by Hart and Sherring near Blue Mountain peak, distinguished from the preceding species by the pinnæ and pinnulæ being parallel-sided, the dwarfing of the lowest pair of the latter, and the final lobes being equal, rounded and uniform. The largest states are tri-pinnate. Plumier's figure I think undoubtedly represents this species, but it does not show the pair of dwarfed pinnules at the base of the pinnæ. Hooker's figure of *D. Pavoni* is also undoubtedly this species, but the figure of *D. adiantoides*, H.B.K., on the same plate is evidently, by the adnate-decurrent basis of the pinnulæ and their rapidly

tapering shape *D. Plumieri*, Hook. (*Davallia adiantoides*, Sw.) It is a very fine and strikingly handsome plant. Owing to its frequent confusion with the preceding species the mainland distribution is uncertain. Willdenow's names are the oldest. It is a discovery of recent years (1885-86) in Jamaica.

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**GENUS VIII.—*Davallia*, Smith.**

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SORI SMALL, subglobose, oval or punctiform, terminal on the veins, marginal or intramarginal; involucre sepal or pocket-like, attached only by the base or more often also by the sides, free and opening exteriorly; veins simple or forked; fronds variable in size and cutting.

As in the last genus, when the sori are marginal the edge of the frond forms an outer valve to the involucre. The vertical range is from the lowest to the highest elevations over the range this Flora covers.

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- a.* —Fronds pinnate or bipinnate.
  - b.* —Fronds pinnate.
    - 1. *D. Imrayana*, Hook.
    - 2. *D. Saccoloma*, Spreng.
  - bb.* —Fronds bipinnate.
    - 3. *D. Sloanei*, Jenm.
    - 4. *D. Parkeri*, Hook.
  - aa.* —Fronds decomposed, not climbing nor prickly. Sori intramarginal.
    - b.* —Involucre sepal-like, attached by the base only.
      - 5. *D. Speluncæ*, Baker.
    - bb.* —Involucre pocket-shaped, attached by the sides.
      - 6. *D. inæqualis*, Kze.
  - aaa.* —Fronds decomposed, scandent, prickly; sori terminal on the segments.
    - 7. *D. aculeata*, Swartz.
    - 8. *D. fumaroides*, Swartz.
  - aaaa.* —Fronds multifid, divisions linear; sori terminal on the segments.
    - 9. *D. clavata*, Swartz.
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1. *D. Imrayana*, Hook.—Rootstock  $\frac{1}{8}$  in. thick, freely repent, densely coated with small castaneous scales; stipites scattered, erect, glossy, naked, dark or chestnut brown, 8-12 or 15 in. l.; fronds chartaceous, naked, light or dark green, simply pinnate, 6-10 in. l., 3-4 in. w., or with few or several lateral pinnae and a similar terminal one; pinnae erecto-spreading, contiguous or sub-distant, linear-lanceolate, the base obliquely cuneate and shortly petiolate, thence tapering to the acute or often obtuse point, 2-3 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. w., entire, margins thin, crenate or serrulate; veins curved, once or twice forked; sori terminal on the veins forming a line just within the margins at the base of the crenatures or very small lobules; involucre transversely half-ovate or sub-lunæ about  $\frac{1}{2}$  or  $\frac{3}{4}$  li. l., twice as long as deep.—Hook. sp. Fil. t. 49. *Saccoloma*, Gr.

Dominica and Guiana, at high elevations. In habit it resembles some of the simply pinnate maiden-hair ferns, such as *A. lucidum*, but is stronger and

rather stiffer. The pinnae are 3-9 to a side, the lowest not reduced. In colour the stipe and rachis varies from brown to nearly black. The sori are close though isolated, one to each crenature of the evenly serrulate margins, and reach from the obliquely cuneate base usually to the apex, forming a well-like series.—Guadeloupe.

2. *D. Saccoloma*, Spreng.—Rootstock short, erect or decumbent, very stout; stipites tufted, erect, 2-3 ft. l. dark brown, glossy, channelled, fibrillose and asperous at the base; fronds 2-4 ft. l. 1-1½ ft. w., chartaceous, glossy bright green, naked, simply pinnate, with a terminal pinna and numerous similar spreading lateral pinnae, ½-1 ft. l. 1-1½ in. w., the base obliquely rounded or subcuneate, the lower ones stipitate; veins close, simple or forked, prominent beneath; sori one to each vein, forming a continuous series along the margins, falling short only of the finely serrated acuminate point; involucre shallow, broader than deep, the crenulate margin of the pinnae forming an uninterrupted outer valve.—Hook. Gen. t. 58, fig. 1-4. *Saccoloma elegans*, Klf.

Throughout the West Indies and Guiana.—Common in forests and on well-shaded banks up to 1,000 or 1,500 ft. alt. Through the veins being close, and each one fertile, the sori form an almost continuous line. From a mistaken or transposed note of Purdie's which represents the rootstock as creeping 20 ft. high, the habit has hitherto been misunderstood. The rootstock is in fact 4-6 in. thick, reaching not more than 1 ft. high; but usually is much less.—General from Panama to Brazil.

3. *D. Sloanei*, Jenm.—Stipites strong, dark-brown, channelled; fronds 3 ft. or more l. nearly as w., bi-pinnatifid or fully bipinnate, chartaceous, pellucid, light glossy green, naked; pinnae alternate, apart, the upper ones narrow, subentire, sessile, the lower 10-15 in. l. 3-6 in. w., petiolate, pinnate at the base, above this deeply pinnatifid, suddenly reduced in the outer third to a one-inch w. ligulate portion which is broadly and roundly lobed, the lobes fading outwards through mere sinuations into the serrulate acuminate point; pinnulae alternate, 3-4 in. l. ⅓-½ in. w., oblique and except the lower one or two fully adnate and connected, with a broad cuneately notched sinus ¼-½ in. w. between; veins once forked; sori terminal on the veins, forming an uninterrupted marginal line; involucre transversely attached, pocket-like, the crenatures of the thin membranous margin forming an outer reflexed valve.—Sloane Cat. p. 19; Hist. p. 89. tab. 47; plts. p. 102. *Pteris. Radd.*

Jamaica.—Gathered by Sloane in 1688 about Mt. Diabolo, where he says it grew at the time in several places. No other collector has found it. Sloane's specimen, cited above, is an entire fertile frond. A good search of Mt. Diabolo for its re-discovery would be well worth the while of any collector. It belongs to the sub-genus *Saccoloma*, and in texture, colour, veining and sori, is closely allied to *S. elegans*, Klf.

4. *D. Parkeri*, Hook.—Rootstock rather slender, a line or less thick, decumbent and shortly creeping, rusty-scaly; stipites scattered, erect, slender, 3-5 in. l. dark coloured, sub-angular and channelled on the face; fronds simply pinnate, or bi-pinnate with 1-3 pair of lateral branches, to which the terminal pinna is conform, thin, pellucid, naked, dark green; pinnae 3-4 in. l., ¾ in. w., spreading, the base variably narrower or wider than just above it; pinnulae dimidiate, numerous and closely placed, 4-5 li. l., hardly more than 2 li.

d., like a quarter of an oval or ellipse in shape, inner and under margins plain, upper curved and obtusely toothed or crenulate-incised; main vein eccentric, sending a few branches to the lobules of the margin, bearing the sori on their apices; involucre subreniform, attached at the base, forming a sub-marginal line.—Hook. sp. Fil. vol. 1. t. 53.

British Guiana.—Common, gathered in numerous places from the creeks of the lower parts of the Demerara river to the Potaro above the Kaieteur Fall and the Barama in the north-west—in fact on most of the rivers and creeks of the Colony. It grows generally under banks in very damp places, where it is often submerged by the rising water. It has a close resemblance to some of the smaller states of *Lindsaya* which is deceptive at first sight. The majority of the fronds are simply pinnate, but the bipinnate ones grow with them on the same rootstocks. Morphologically its alliance is with *Lindsaya*, for besides its habit, veining and the dimidiate segments, where the margin is not crenate the sorus is continuous. Endemic.

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5. *D. Spelunca*, Baker.—Rootstock branched, short-creeping; stipites close, erect, 2–3 ft. l. lightly channelled; fronds 4–5 ft. l.  $2\frac{1}{2}$ –4 ft. w., tri-quadrifid, rather soft, greyish green, both sides lightly pubescent; pinnæ apart, alternate,  $1\frac{1}{4}$ –2 ft. l. 5–10 in. w., acuminate, nearly sessile; pinnulæ numerous,  $2\frac{1}{2}$ –6 in. l.  $\frac{3}{4}$ – $1\frac{1}{2}$  in. w., sessile or nearly so, lobed to the acuminate point; tertiary segments approximate, rhomboidal, broader on the outer side,  $\frac{1}{3}$ – $\frac{1}{2}$  in. l.  $2\frac{1}{2}$ –5 li. br., blunt, dentate, deeply pinnatifid or fully pinnate, the lowest on the inferior side largest; final lobes 3–7 to a side,  $1\frac{1}{2}$ –3 li. l.  $\frac{1}{2}$ – $1\frac{1}{2}$  li. w., blunt, the larger dentate; veins forked, not reaching the margin; sori sub-marginal, terminal on the lowest veinlet in the crenatures at the base of the lobes, one to each except the large basal lobe which has 2–4; involucre wider than deep, attached by the base, ciliate or not.—*D. jamaicensis*, Hook. *D. polypodioides*, Eat. *Polypodium Spelunca*, Linn. *Microlepia antillarum*, Mett.

Cuba and Jamaica to Trinidad.—Frequent in open and bushy places among the lower hills, and extending upwards to 2,000 or 3,000 ft. alt. It varies a good deal in size, shape of pinnæ and pinnulæ, and in pubescence. The texture is uniformly soft. The smallest states are less than a foot long and 3–4 inches wide and simply bipinnate, while the largest are eight feet high, quadrifid, and the pinnæ two feet long and nearly a foot wide. Yet it is very characteristic in all states—widely spread on the mainland southward to Brazil and in tropical Asia and Africa, reaching Japan, Queensland and Natal.

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6. *D. inaequalis*, Kunze.—Rootstock very stout, erect; stipites tufted, 3–4 ft. l. channelled, scaly at the base; fronds nearly deltoid, 3–4½ ft. l.  $2\frac{1}{2}$ –4 ft. w., firm, naked, glossy pale green, quadrifid; pinnæ alternate, similar in shape to the frond,  $1\frac{1}{2}$ –2 ft. l.  $\frac{3}{4}$ – $1\frac{1}{4}$  ft. w., lax, petiolate, serrate, acuminate, the larger deeper on the lower side; pinnulæ proportionately reduced; tertiary segments similarly shaped,  $\frac{3}{4}$ –2 in. l.  $\frac{1}{3}$ – $\frac{3}{4}$  in. w., hardly sessile, the apex serrate or dentate, below this fully pinnate, the outer side the deeper; final segments ovate-oblong, dentate, or at the base lobate, 3–5 li. l. 1–2 li. br.; veins simple or forked, not reaching the margin; sori 2–6 to each of the final segments, placed against the shallow teeth, sub-marginal; involucre deeper than broad, quite enclosing the sori, pocket-shaped,



opening only at the top.—Hook. Sp. fil. vol. i. t. 57, B. and 58, A.; Sloane's t. 57. *D. alata*; Heward, Mag. of Nat. Hist., 1838, p. 465. *Microlepia alata*, J. Sm.

General throughout the West Indies and Guiana. Frequent in mountain forests from 2,000–4,000 ft. alt. A large multifid cut species, of pale or straw green colour, with glossy naked surfaces, and lax habit. The lower pinnæ are deeper on the inferior side, but this character is gradually reversed in those above. The pocket-shaped involucre only open at the—sight clearly mark it from any other American species. A much more divided species than *D. adiantoides*, Sw. (*D. Plumieri*, Hook).—Venezuela to Brazil and Peru.

7. *D. aculeata*, Swartz.—Rootstock prostrate, short-creeping, densely fibrillose; stipites close, variable in length, castaneous, glabrous; fronds ascending few to many ft., scandent, dark green, naked, chartaceous, quadripinnate; pinnæ opposite, horizontal, nearly sessile,  $1\frac{1}{2}$ –3 ft. l.  $\frac{3}{4}$ – $1\frac{1}{2}$  ft. w.; pinnulæ alternate,  $\frac{1}{2}$ –1 ft. l. 2–5 in. w., the basal pair conspicuously reduced; tertiary divisions 1–4 in. l.  $\frac{1}{2}$  in. w., the several lower ones usually much the largest; final pinnules cuneate-flabellate, pinnate or pinnatifid, 2–3 li. w. and d., forming 1–3 emarginate or bifid wedge-shaped blunt lobes, which are  $\frac{1}{2}$ – $\frac{1}{3}$  li. w., and into which usually a single veinlet runs; rachis and other ribs more or less castaneous, flat or channelled down the face, prickly beneath, costæ and costulæ flexuose or zig-zag; sori at the ends of the final lobes, one to each; involucre cuneate, rather deeper than w. opening at the top.—Hook Sp. Fil. vol., 1, t. 54, B. Plum. Fil. t. 94, (greatly exaggerated). *Lindsaya*, Mett.

Cuba and Jamaica to Dominica. Abundant in forests and on their skirts, forming dense and impenetrable thickets from 2,500 ft. alt. up to the highest ridges and peaks. The fronds reach 15 or 20 ft. high, supported by each other on the surrounding bushes or trees, the lower pinnæ dying and decaying away as the top of the frond extends. Cutting through a thicket, it emits a very offensive smell, and the juice produces a yellowish stain or dye. This and the next are apparently confined to the West Indies.

8. *D. fumarioides*, Swartz.—Rootstock prostrate, short-creeping; stipites close, a foot or more l., sparsely prickly; fronds ascending few or several ft. high, 3–5 ft. w., quadripinnate, naked, light green, rachis angular, and with the flexuose or zig zag costæ armed with recurved prickles, channelled, straw or chestnut coloured; pinnæ opposite, nearly sessile,  $1\frac{1}{2}$ –3 ft. l.  $\frac{3}{4}$  l. ft. w.; pinnulæ usually alternate, 4–8 in. l., 2–3 in. w., lowest pair reduced and unequal; tertiary divisions the same shape, nearly sessile, 1–2 in. l.,  $\frac{1}{2}$ – $\frac{3}{4}$  in. w.; flabellate, deeply pinnatifid or fully pinnate, 2–3 li. w. and final pinnules l. or deeper, the divisions cuneate, and cut into linear lobes  $\frac{1}{3}$  li. w., a single vein running into each; sori terminal; involucre scarcely cuneate, open at the top.—Sloane t. 61. Schkh. Fil. t. 129. *Lindsaya*, Mett.

Cuba and Jamaica. Abundant among the lower hills on the skirts of woodland, among bushes, in hillside pastures, and by open pathways, but not forming such dense thickets as the preceding, of which it is the lowland analogue, ascending only to about 2,500 ft. alt. where that first appears. The two species hardly touch in their respective ranges. This is of thinner texture, pale colour, more prickly, the final lobes narrower more numerous, deeper cut, and rather smaller sori and involucre. The deeply incised segments distinguish it at a glance. San Domingo and Porto Rico.

9. *D. clavata*, Swartz.—Rootstock creeping, thick as cord, densely fibrillose, interlacing; stipites slender, naked except the base, 3–8 in. l. channelled, straw green; fronds tri-quadripinnate, firm naked,

light-green, 4-10 in. l. 2-4 in. w.; pinnae lax, alternate, petiolate; other divisions proportionately reduced, but similar; final segments flat, linear, broadest at the truncate apex,  $\frac{1}{2}$ - $\frac{3}{4}$  li. w., one or two veins to each; sori terminal; involucre broadly attached by the base, as wide generally as the leaf-segment, the receptacles formed by the thickened apex of a single vein or by the transverse union of two.—Plum. Fil. tab. 101. B. *Adiantum*, L. *Lindsaya* Bernh. Mett.

Bahamas, Cuba and Jamaica to the French Islands. Frequent, on wet rocks, by the banks of streams and rivers, in shaded or open situations from sea-level up to 3,000ft. alt. in the eastern parishes. In the West Indian flora this is an exceptional species, closely connected with some of the Asiatic and Australian species of *Lindsaya*; the fronds consist of the vascular framework and narrow wedge-shaped final segments.

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### GENUS IX.—*Cystopteris*, Bernh.

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SORI punctiform, medial on the back of the veins; involucre attached by the base, hood-like, covering the sori at first; fronds small, multifid, herbaceous; veins free, branched.

This genus differs from the two preceding by having the sori midway on the veins instead of near to or at their summits and in the form of involucre.

1. *C. fragilis*, Bernh.—Rootstock branched, shortly repent, clothed with small dark scales; stipites tufted, 1-4 in. l. slender, channelled, slightly fibrillose at the base; fronds lanceolate, 5-10 in. l.  $1\frac{1}{2}$ -4 in. w., bi-tri-pinnate, herbaceous, naked, light or dark-green; rachis slender, channelled, glabrous; pinnae numerous, near or apart, nearly sessile,  $\frac{3}{4}$ -2 in l.  $\frac{1}{3}$ -1 in. w., acute or acuminate at the serrate point; pinnulae 2-7 li. l. 1-3 li. w., rather lax, dentate or pinnatifid, acute, usually broadest at the base; teeth sharp; veins pinnate or forked in the lobes; sori medial, copious, several to the larger more entire lobes; involucre broadly attached around the base of the sori thence arising hood-like, terminating in an acute point.—*C. jamaicensis*, Desv. Eat. Ferns N. Amer. pl. 53.

Jamaica.—Infrequent, but plentiful where present, on wet rocks in the beds of streams from 4,000-5,000 ft. alt., gathered at Old England plantation, and a few hundred feet higher in streams of the Government Cinchona Plantation. It varies in aspect and in size and cutting, the fronds varying from 6 in. to a foot high. The involucre shrivel at length, leaving the sori naked. In heavy weather the fronds are washed away, but the rootstocks, which cling tightly to the rocks, spring again when the stream subsides. Found also in Britain and in all the principal countries of the world up to the Arctic regions and South to New Zealand and at high elevations in the Trop. zone.

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### TRIBE V.—*Lindsayaceæ*.

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SORI marginal or sub-marginal, linear or oblong; involucre interiorly attached, the same shape as the sori, usually narrower than the leaf margin which forms an outer-pseudo valve; leaflets equilateral or dimidiate.

A single genus, generally of very distinct aspect, forms this tribe. In the form of the fronds and the dimidiate character of the leaflets in the great majority of the species there is a close superficial

resemblance to the *Adiantecæ*, but the colour is quite different, and the fronds are devoid of any surface vestiture, in addition to the chief distinction that the involucre in this genus are attached interiorly and open along the exterior edge, folding backwards.

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GENUS X.—*Lindsaya*, Dryand.

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SORI marginal or sub-marginal, transversely oblong, or linear and continuous, involucrel valve inserted on the inner side of the sorus, attached only along the base, open exteriorly, the margin forming an outer indusaeform valve; fronds simple and equilateral or compound, with dimidiate segments, the mid-vein of which is excentric; veins free, or transversely united at the summits, thus forming the receptacles of the sori.

This is a moderately extensive genus, confined principally to tropical regions, a few species only extending to the warm temperate latitudes in the Southern Hemisphere. Between 60 and 70 species are known. About one-third of the number are found in tropical America, chiefly on the mainland, few being represented in the West Indies proper.

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Fronde simple, equilateral; veins free.

Fronde reniform.

1. *L. reniformis*, Dry.

Fronde subdeltoïde.

2. *L. sagittata*, Dry.

Fronde pinnate, pinnæ equilateral; veins anastomosant.

3. *L. macrophylla*, Kaulf.

Fronde pinnate, pinnæ unilaterale; veins free.

4. *L. falciformis*, Hook.
5. *L. dubia*, Spreng.
6. *L. crenata*, Klotzsch.
7. *L. pumila*, Klotzsch.

Fronde pinnate or bipinnate, pinnæ unilaterale; veins free.

8. *L. arcuata*, Kze.
  9. *L. falcata*, Dry.
  10. *L. botrychioides*, St. Hil.
  11. *L. mazaruniensis*, Jenm.
  12. *L. candata*, Hook.
  13. *L. trapeziformis*, Dry.
  14. *L. guianensis*, Dry.
  15. *L. portoricensis*, Desv.
  16. *L. stricta*, Dry.
- Fronde uniformement bipinnate.
17. *L. aquatica*, Jenm.
  18. *L. parvula*, Fée.
  19. *L. pendula*, Klotzsch.
  20. *L. tenuis*, Klotzsch.

1. *L. reniformis*, Dry.—Rootstock slender as twine, rather free-creeping, clothed with minute scales; stipites scattered, 3-5 in. l., wiry, polished dark brown or blackish, slightly scaly at the very base; fronds orbicular-reniform, 2-3 in. w., 1-2 in. d., with a broadly curved open sinus, the edge of which is even; outer margin serrulate in barren fronds, naked, subcoriaceous; veins flabellate, obscure, two or three times forked, terminating with thickened apices short of the margin; sori continuous around the outer edge, intramarginal.

Guiana.—Scattered through the forest among other herbage on certain of the Rivers, but not so plentiful a species as the next. A tendency is shown by an occasional frond to become pointed, and so approach *sagittata* in shape. The habit is that of *Adiantum reniforme*.—Brasil.

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2. *L. sagittata*, Dry.—Rootstock creeping like that of the preceding; stipites 3-8 in. l. polished dark brown or blackish; fronds sagittate, 2-4 in. each way; acuminate, the basal auricles rounded or acutely pointed with a deep variable sinus between veins, texture, &c., as in the preceding; sori conspicuously intramarginal, in a thread like line all round the margin except the sinus, and often short of the apex.—Hook., Grev. Ic. t. 87.

Guiana.—Common in the forests of the interior on well drained ground. The shape of the frond is variable, in some of the smaller ones the basal auricles are rounded, but in the majority they are extended to an acute angle making the outline triangular or deltoid. The involucre is very narrow and the 8th of an inch from the margin. This seems to be the ultimate state, as some are found in transition. The sinus is  $\frac{1}{2}$ -1 in. deep, open or the sides close together or connivent.—Guadeloupe, Surinam and Cayenne.

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3. *L. macrophylla*, Kaulf.—Stipites tetragonal, 2 ft. l., strong, erect, brown, channelled, glossy, with a few minute brown scales at the very base; fronds composed of a few large lateral pinnæ and a similar but somewhat larger terminal one, chartaceous, densely pellucid, dotted, pale green; rachis like stipe; pinnæ spreading, lanceolate-acuminate, lowest petiolate, the upper margined below the obliquely rounded base, tapering outwards, 6-7 in. l.,  $1\frac{1}{4}$ -2 in. w., midrib prominent beneath, but nearly evanescent at the point, covered by the parenchyma on the upper side; veins very oblique, uniting towards the margin, forming linear oblong areole, the marginal series much reduced; sori continuous along both margins, conspicuously within the edge, which is thickened and thread-like, involucre very narrow, and reflexed eventually under the matured sporangia.

Guiana. This agrees in habit and the shape of the pinnæ entirely with *Adiantum Phyllitidis*, but is larger, and a very fine plant. The rachis and petiole are tetragonal and of a curious grayish-brown stone colour, and very glossy, the lateral pinnæ are deeper on the upper side at the base than on the lower.—Brasil.

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4. *L. falciformis*, Hook.—Rootstock shortly repent, or fasciated, finely rusty scaly; stipites subtufed, flattened on the face, stramineous or brown, erect,  $\frac{1}{2}$  in. l. or over; fronds 2-3 in. l.  $\frac{1}{2}$  in. b. pinnate, chartaceous, pellucid, pale green; rachis quadrate, channelled down the face; pinnæ very close, numerous, dimidiate, decurved, 3-4 li. l.

hardly more than 1 li. b.; veins once forked; sori continuous, along the curve of the upper and outer edge; involucres narrow.—Hook. Sp. Fil. vol. 1, t. 64. B.

Guiana. Collected only by Schomburgk, who did not record the locality. A peculiar little plant, not more than three inches high, several of the fronds being only half that, but all fully fertile. Mr. Baker has suggested that it may be unbranched *trapeziformis*, which, though it has the quadrate rachis of that species, is judging by other characters very doubtful.

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5. *L. dubia*, Spreng.—Rootstock slender, wiry, short-creeping, minutely scaly; stipites close together, usually in tufts, slender but rather wiry, and erect, 3-6 in. l.; fronds simply pinnate, lanceolate or oblong—lanceolate, 6-10 in. l. and 2-3 in. br. reduced at the base; rather stiff, pale green; rachis slender, wiry pinnæ linear nearly  $\frac{1}{4}$  in. apart, spreading horizontally 1-1 $\frac{3}{4}$  in. l.; 1-1 $\frac{1}{2}$  li. br.; blunt at the end; under edge even, straight or rather upcurved, upper serrulate-sinuate in the outer part, base truncate and diverging from the rachis; veins distinct, oblique, forked and simple, not reaching the edge; sori continuous, or interrupted in the outer part, usually not extending more than half or  $\frac{2}{3}$  along the upper margin.—Hook. Sp. Fil. t. 64. C.

Guiana. Very plentiful in the forest in localities near the banks of Rivers. This is a beautiful little plant, very distinct from any of its neighbours, remarkable for its lax, slender, habit and narrow, linear, dimidiate pinnæ, which spread uniformly right and left. The continuity of the sori is usually broken by the serrulation of the outer superior margin. The terminal segment is not wider than the lateral and is laxly dentate. Both stipites and rachises are angular, and the angles are membranous margined.—Venezuela and Brasil.

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6. *L. crenata*, Klotzsch.—Rootstock slender, short-creeping, clothed with scale-like hairs; stipites erect, dark-brown, glossy, quadrate, short, fronds erect, coriaceous, rigid, oblong-lanceolate, a span or more l.; pinnate; pinnæ close, or somewhat imbricating, horizontal, dimidiate-oblong; the margins defalcate, the upper crenate-serrate with a narrow raised edge, the under costate; rachis tetragonal, glossy, dark brown; veins forked; sori continuous along the upper margin.—Hooker, Sp. Fil., vol. 1, p. 208.

Guiana, collected by Schomburgk. This I have not seen, but judging from Hooker's description it seems to be a distinct plant, though possibly it may be only a variety of some other. It appears to be distinguished by its short stipites, simply pinnate cutting, rigid coriaceous texture which is opaque, and the thickened costate edges of the segments.

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7. *L. pumila*, Klotzsch. (non Hook).—Rootstock slender, slightly scaly, very short-creeping; stipites arising together, quadrate and sharp-edged, as are the rachises, castaneous below, 2-3 or several, 1-2 or 3 in. l.; fronds 2-4 in. l.,  $\frac{3}{4}$ -1 in. br., pinnate, chartaceous, dark green; pinnæ contiguous but not close, with a larger subdeltoid terminal segment, 8-15 to a side, 5-7 li. l., 2-2 $\frac{1}{2}$  li. w., the upper and outer margin rounded, the under straight or rather decurved, the inner truncate; sori continuous from the end of the inner superior

margin to the outer end of the inferior one; the involucre nearly or quite as wide as the indusaeform margin.—Hook. Sp., Fil. vol. 1. p. 209.

Guiana. A very dwarf little plant. One of the smallest of all the *Lindsayas* known; most abundant on the perpendicular banks (a situation it evidently prefers) of the upper reaches of the Potaro river below the Kaieteur, and plentiful also just above the Fall, and on the Demerara and other rivers, always on shady banks or rocks by the shore. Though so abundant it is most uniform in habit, but in the Chinabowa forest, about two days journey above the Kaieteur, two or three plants very similar, but twice as large, with a pair of basal pinnate branches were found. In the smaller fronds, the pinnæ are obliquely cuneate. It was first gathered by R. Schomburgk, and appears to be endemic.

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8. *L. arcuata*, Kze.—Rootstock shortly creeping; stipites wiry, erect tetragonal, as is the rachis, brown or straw-coloured, about 6 in. l.; fronds bipinnate, 6–9 in. l., branched at the base; chartaceous, pale green; segments linear-oblong, curved, rounded at the end; lower margin even, upper often serrulate in the outer third,  $\frac{3}{4}$ – $1\frac{1}{2}$  in. l. 2– $2\frac{1}{2}$  li. w.; veins oblique, forked, costal one a little within the inferior margin; sori usually continuous.—Hook. Sp. Fil. vol. 1. p. 215.

Guiana. Infrequent in forests, Macouria River and at Pacatout, Potaro River. Unbranched fronds have the habit and a good deal resemble, *L. dubia*, but the leaflets are broader and the outline is rather recurved. In my specimens some of the fronds are simply pinnate and others bipinnate with a single or single pair of short branches at the base on the same rootstocks.—Peru.

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9. *L. falcata*, Dry.—Rootstock stout as cord, densely coated with adpressed, subulate, chestnut-brown, minute, scales; stipites approximate along its axis, erect,  $\frac{1}{2}$ –1 ft. l. quadrate, castaneous or stramineous, with pale scariose edges, naked, rachises the same; fronds pinnate, or bipinnate at the base,  $\frac{3}{4}$ – $1\frac{1}{2}$  ft. l. 3 in. w., with a terminal pinna cuneate at its base and fertile around the upper and outer margin; pinnæ pale green, chartaceous, spreading, cuneato-stipitate or sessile, dimidiate or sub-dimidiate,  $1$ – $1\frac{1}{2}$  in. l.  $\frac{1}{2}$ – $\frac{3}{4}$  in. w., the inner edge truncate and nearly parallel with the rachis, or concave, the lower straight or defalcate, the upper curved and sublunate, terminal segment enlarged and subdeltoid; veins close, forked, flabellate, combined at the margin by the linear unintermittent receptacle; sori continuous along the upper and outer margin of the pinnæ; involucre as wide or narrower than the scarious edged indusaeform margin.

Var. *a. L. Leprieuri*, Hook.—Exactly like the type, but dwarf, the slender stipe 3 in. l. and the frond the same; 1–5 pinnæ to a side with a larger deltoid terminal one—Hook. Sp. Fil. vol. 1, t. 62, D.

Var. *b. subrotundifolia*, Jenm.—Like the type in size, but with rounded pinnæ, cuneate at the base, coarse, prominent, flabellate venation, with clavate apices, the terminal one rounded too, all parts devoid of angles.

Var. *c. Lancea*, Mett.—Like the type in habit, but dark green, with smaller, closer, much more numerous close, almost imbricating, pinnæ, the terminal lanceolate or deltoid, the base of the frond sometimes with a short branch on one side.—*Adiantum*, *L.*

Throughout the West Indies to Guiana. Well marked by its large lanceolate, simply pinnate fronds and large pinnæ. Var. (*c.*) is the form that is found on the Islands. All the forms are abundant in Guiana.

10. *L. botrychioides*, St. Hil.—Rootstock slender, repent, clothed with hair-like dark chestnut brown small scales; stipites contiguous, erect, strict, but slender,  $\frac{1}{2}$ – $\frac{3}{4}$  ft. l., polished, very dark bright chestnut brown, terete but channelled; fronds erect, stiffly lanciform, simply pinnate, 1–1 $\frac{1}{2}$  ft. l. 1 $\frac{1}{2}$  in. w.; pinnae chartaceous, pellucid, dark shining rich brown-green, spreading, sublunate, 24–36 to a side,  $\frac{1}{2}$ – $\frac{3}{4}$  in. l.  $\frac{1}{4}$ – $\frac{1}{2}$  in. w., the lower ones open, the upper contiguous, gradually reduced above, the terminal subdeltoid, but rounded and the smallest of all, and fertile along its sinuated sides; veins forked, flabellate prominent; sorus marginal continuous, the recurved margin at first concealing it.—Hook. & Baker, Syn. Fil. p. 105.

Guiana. Growing in large upright tufts in open savannah swamps some few miles inland in the pegass region which stretches along behind the seaboard of the Colony. The species is very interesting and attractive owing to its erect habit and richly coloured parts, the vascular parts shining like polished mahogany, by which colour the leaves are tinged too.—Brazil, gathered by Burchell.

11. *L. mazaruniensis*, Jenm. n. sp.—Rootstock prostrate, repent, ligneous, as thick as strong cord, densely clothed with fine dark-brown scales; stipites serial, contiguous, strong, stiffly erect, naked except at the very base, brightly polished, ebeneous, 1 $\frac{1}{2}$  ft. l. terete but channelled down the face; fronds erect, bipinnate, consisting of a central lanciform pinna and a pair of shorter but conform erecto spreading basal lateral ones, the latter 4–6 and the former 8–10 in. l. both 1 $\frac{1}{4}$ –1 $\frac{1}{2}$  in. w.; pinnules rhomboidal, rounded with a long curve to where the inferior inner half is cut away with a corresponding curve,  $\frac{3}{4}$  in. l.  $\frac{1}{4}$  in. d., the base truncate, slightly overlapping the tetragonal richly polished dark castaneous rachises, thin, pellucid, dark-green, with a large elongated deltoid terminal segment; veins forked, flabellate; sori continuous, threadlike conspicuously intra-marginal, the even margin spreading broadly beyond it.

Guiana—Mazaruni river in sandy forests; intermediate in colour and form between the last and the following species, but quite distinct from either. It is marked by its dark glossy colour, the large elongato-deltoid terminal segment, its single pair of basal conform pinnae, and the conspicuous margin beyond the sorus of each, as in *L. saittata*.

12. *L. caudata*, Hook.—Rootstock short-creeping, scaly; stipites strong, erect, 1–2 ft. l., terete, channelled upwards, polished and nearly black; fronds erect, regularly bipinnate,  $\frac{3}{4}$ –1 $\frac{1}{2}$  ft. l. and nearly as wide, composed of 3–6 contiguous lateral erecto-spreading pinnae and a similar terminal one, stipitate to  $\frac{1}{4}$  in., acuminate, 1–1 $\frac{1}{2}$  in. w., 5–10 in. l.; rachis rounded beneath, with sharp edges down the face, costae, quadrate, and sharply edged on both sides, both polished and passing into dark chestnut; pinnules numerous, very close, chartaceous, pellucid, dark green,  $\frac{1}{2}$ – $\frac{3}{4}$  in. l.,  $\frac{1}{4}$  in. d. dimidiate, the outer ones reduced but not minutely, the upper and outer margin curved, the under straight or slightly decurved, the inner truncate; veins forked, flabellate; sori continuous round the upper and outer margin, which extends beyond it and the narrow involucre.—Hook. Sp. Fil. p. 215.

Guiana; common in forests over a great part of the country. It may be recognised at a glance by its very dark colour, which at a little distance appears as if purple or black, and its regular pinnatifid habit, the branches spreading regularly from bottom to top of the fronds. It is entirely identical with the specimens I possess from Mr. Wall of the Ceylon plant.—Ceylon.

13. *L. trapeziformis*, Dry.—Rootstock decumbent, fasciculate, clothed with minute, subulate, castaneous scales; stipites erect, quadrate, channelled, with sharp edges, to which the rachises conform; fronds bipinnate, with a large terminal pinna similar to the lateral; pinnæ few, spreading, 6-8 in. l.  $1\frac{1}{2}$ -2 in. w.; pinnulæ copious, close,  $\frac{3}{4}$  to nearly 1 in. l. 4-6 li. w. oblong-dimidiata, entire, superior edge curved or sub-lunate, under straight or defalcate, inner truncate and parallel with the costæ or rachis, terminal one large, acuminato-deltoid, entire, or lobate at the base; veins forked, spreading flabellately, with clavate apices, not reaching the edge; texture rather thinly chartaceous; sori continuous along the upper and outer margin, usually falling short of the basal edge; involucre very narrow, much exceeded by the indusæform.—Hook. Gen. t. 63. A.

*a. var. L. quadrangulares*, Radd.—Pinnæ 3-5 to a side, 1 in. w., pinnulæ half as large as in the type.

*b. var. L. horizontalis*, Hook.—Fronds bi-pinnate, pinnæ  $\frac{3}{4}$ -1 in. w., 4-5 in. l., segments rather lax,  $\frac{1}{2}$  in. l. 2-3 li. w.. under margin straight or upcurved, upper straight or decurved.—Hooker, Sp. Fil. t. 62, f. B.

West Indies generally from Cuba to Trinidad and Guiana. The largest state which I have taken as the type of this species is a well marked plant, with generally 2-5 branches on each side and a similar but often larger terminal ones. The segments are close but not actually imbricating, usually strictly oblong, the same width at both ends, the outer edge being parallel with the inner but with the angle rounded. The petiole and rachises are strong, generally stramineous and quadrate, with sharp angles. This is found chiefly in Trinidad and Guiana, *a* is similar but reduced in size, with usually more lateral branches, longer than the terminal, and much smaller segments, and is only distinguished from *Guianensis* by its tetragonal stems, *b* is the form found in Jamaica and Dominica. It has one to two spreading branches as long as the central one, the segments having a straight upper edge and a surcurved under one as a rule. In any large series of specimens of this and the next species the only reliable character for dividing them is the sharp-angled, square, stem and rachis, which invariably characterise this.—Widely spread throughout tropical America.

14. *L. guianensis*, Dry.—Rootstock fasciculate, shortly repent; stipites arising together,  $\frac{3}{4}$ - $1\frac{1}{2}$  ft. l., stramineous or brown, channelled down the face, rounded on the back; fronds bipinnate, chartaceous, straw-green, composed of several patent or erecto-patent lateral pinnæ and a similar terminal one, each  $\frac{1}{2}$ -1 ft. l. and 1 in. or rather more w.; pinnulæ numerous and close,  $\frac{1}{2}$  in. l.  $\frac{1}{4}$  in. b., dimidiata, the upper margin much curved, the under less so or nearly straight, the inner truncate; rachis and costæ stramineous or brown, rounded on the back, or the costæ often sharply quadrate; veins forked, spreading flabellately, fine, close; sori sub-marginal, continuous, reaching fully, or not quite, round the superior and outer margin, which when barren is crenulato-dentate, the narrow involucre exceeded by the indusæform margin.

*a. Var. L. montana*, Fée.—Colour throughout pale straw-green; pinnæ gradually much tapered; pinnulæ very numerous and close, gradually diminishing outwards to very minute segments; costæ rounded on the back.—Fée. Fil. Ant., t. 6, f. 2.

*b. Var. imbricata*, Jenm.—Fronds usually thrice as large as in the type, stramineous, rarely darker; pinnæ twice as numerous,  $\frac{1}{2}$ - $\frac{3}{4}$  in. w. much tapered; pinnules very numerous and uniformly imbric-



cated, much curved on the upper margin, dwindling to minute segments outwards; costæ rounded on the back. *L. guianensis*, Hook Sp. Fil. t. 62. A.

c. Var. *venosa*, Jenm.—Fronds as in the type; petiole rachis and costæ stramineous or chestnut brown, upper margin of segments serrulate when barren; sori interrupted, forming short contiguous patches.

Generally spread from Cuba to Trinidad and Guiana. In Guiana it is spread abundantly over nearly the whole country at all elevations. From the smaller states of *trapeziformis*, which the type most resembles, it may be known by the petioles and primary rachis being always rounded on the back. *a.* is marked by its pale straw-colour and tapering patent pinnæ. *b.* is found plentifully in the forest opposite Bartica Grove, Essequibo River. It is the largest plant of all with 10-15 narrow pinnæ (twice as many as any of the other varieties) to a side with imbricating pinnules, and is as a rule of a light green colour. *c.* is found in the forest near the Kaieteur Savannah. It is well marked by the interrupted sori. A single pinna agrees exactly with a frond of the East Indian *L. cultrata*, Sw. of which it might be taken in a bipinnate state.—General throughout tropical America on the Atlantic side.

15. *L. portoricensis*, Desv.—Rootstock fasciculate, shortly repent, clothed with fine ferruginous scales; stipites erect, castaneous, 1-2 ft. l.; terete below, above flat with a sharp edge on each side; fronds erect, bipinnate composed of 1-2 or 3 pair of erect lateral pinnæ and a similar much longer central terminal one, all  $\frac{3}{4}$ -1 in. w., 8-12 in. l.; rachis rounded on the back in the lower part, the face flat and sharp edged, as is the upper part on both sides and as are also the costæ; colour bright chesnut, paling to straw colour in the outer part of the costæ; segments subdimidiate,  $\frac{1}{3}$ - $\frac{1}{2}$  in. l. 2-3 li. b.; very numerous, close or contiguous, chartaceous, pellucid, shortly oblong, the upper and outer margin curved, the inner truncate, and the lower straight or somewhat decurved; sori continuous, intramarginal—the thin indusaeform margin spreading beyond it and the narrow reflexed involucre; veins forked, flabellate.

Guiana; not infrequent. It is one of the best marked and least variable of species and quite unmistakable, possessing the habit of growth of *stricta*—the few lateral pinnæ ascending by the side of the larger terminal one—and the pinnulæ of *guianensis*.—Porto Rico.

16. *L. stricta*, Dry.—Stipites slender, erect, arising from a short-creeping rootstock, hardly any to  $1\frac{1}{2}$  ft. l., glossy chesnut-brown, naked or fibrillose at the base; fronds erect, rigid and coriaceous, naked,  $\frac{3}{4}$ - $1\frac{1}{4}$  ft. l., simply pinnate, or bipinnate by the presence of 1-3 pairs of lateral branches, which spring from the base and grow erect, parallel with the much longer terminal branch, each  $\frac{1}{2}$  in. w. and tapering very gradually till the segments become minute to the acuminate apex; segments 2-3 l. d. each way, very numerous, close or imbricated, cuneate and forming a quarter circle in shape, slightly rugose and concave; fertile in an unbroken line along the curved superior edge; rachises rounded on the back, flat on the face; veins forked, flabellate; involucrel margin subcrenulate and recurved; special valve pressed back by the sporangia at maturity.—*L. elegans*, Hook. Icon. t. 98.

Jamaica, Trinidad and Guiana.—This is narrower in its pinnæ, and stiffer than the last, with shorter segments often concave, which form a quarter of a circle in shape rather than a quarter of an ellipse or oval as those of the other species generally do. The pinnate and bipinnate fronds are usually found together in Guiana, where the species is widely spread over the sandstone region to the highest elevation.—Tropical America generally.

17. *L. aquatica*, Jenm n. sp.—Rootstock about 1 li. thick, free-creeping, clothed with fine ferruginous hair-like scales; stipites scattered, erect, very slender, terete, channelled, stramineous, 1-2 or 3 ft. l.; fronds erect bi-pinnate, very lax in habit, straw-green, fragile,  $1\frac{1}{2}$ -2 ft. l. composed of 1-10 pairs of distant, erecto-spreading slender tapering lateral pinnae which are 5-10 in. l. and  $\frac{1}{3}$  in. w., with a longer terminal one, which is rather wider; rachis and costæ very slender, terete, channelled, stramineous; segments dimidiate, contiguous, but not crowded, the inferior ones more open, forming about a quarter oval-oblong,  $1\frac{1}{2}$ - $2\frac{1}{2}$  li. l. and d. but usually rather longer than deep; the under edge costate and translucent, the upper plain or undulate, and extended beyond the sorus and involucre; veins forked, flabellate.

Guiana, Maicouria River, growing in beds of aquatic grass and sedge by the banks. It is intermediate between *stricta* and *parvula*. As in the latter, the pinnae are several and uniform on each side, but as in the former, though not so much so, they spread from the rachis at a narrow angle, and are therefore more or less erect. They are 2-4 in. apart, narrow, tapering, and only straight in the smaller fronds. Though the plants are very slender and fragile, and easily broken and damaged, the segments are rather coriaceous in texture. The rootstock is about the thickness of medium sized twine, and runs freely through the grass &c. in which the plant grows.

18. *L. parvula*, Fée.—Rootstock slender, shortly repent; stipites erect, 1- $1\frac{1}{2}$  ft. l., a dull straw or brown colour, slender; fronds bipinnate the branches short, erecto-spreading, with a similar but rather longer terminal one, firm and rather stiff, light dull green; rachises and costæ rounded, channelled, slender, coloured like the stipites; pinnae in from two to eight pair, with a tendency to be more erect than divergent, from  $1\frac{1}{2}$ -4 or 5 li. w., and  $1\frac{1}{2}$ -3 in. l., the segments becoming gradually more minute at the acuminate apex; pinnulae very numerous, close and often imbricating, hardly so deep, the base cuneate, fertile along the superior margin, which is straight or curved, or occasionally hollow; veins flabellate, involucre narrow, slightly exceeded by the indusaeform margin.—Fée's Fil. Ant. tab. 7, fig. 2.

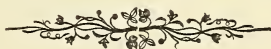
Trinidad and Guiana. Infrequent, but abundant where found. This is the most finely cut species of all, in habit between *stricta* and *aquatica*. The colour is generally pale and stramineous, but dull, the pinnae uniform, erecto-spreading,  $\frac{3}{4}$ -1 in. or more apart, the segments numerous, minute, usually rounded, with a curved underline, and close and imbricating. In Guiana, it grows in large tufts within water mark on the banks of creeks and on decaying stumps in the water.

19. *L. pendula*, Klotzsch.—Rootstock slender as cord, free-creeping, densely clothed with fine dark-coloured scales; stipites apart, erect, slender,  $\frac{3}{4}$ - $1\frac{1}{2}$  ft. l., straw coloured with a darker base; fronds 6-12 in. l.,  $2\frac{1}{2}$ -4 in. w., rather rigid and coriaceous, opaque, a bright pale straw colour, oblong in shape, with a terminal pinna and 6-18 pair of horizontally spreading, or slightly deflexed lateral ones, about 1 in. apart, the uppermost of which are hardly reduced; pinnae  $1\frac{1}{2}$ - $2\frac{1}{2}$  in. l. with a double row of slightly imbricating, sharply deflexed, cuneato-spathulate segments, which are  $\frac{3}{4}$ - $1\frac{1}{2}$  li. w., and fertile along the outer margin.—Hook. Sp. Fil. vol. 1, tab. 65, fig. A.

Guiana, common in localities among grass and on the skirts of copes in the more boggy parts. It is the most beautiful and best marked of all the native species. The little obtuse pinnulae are deflexed at right angles with the rachis, so that they hang back to back; the fronds are about the same width throughout, being hardly reduced upwards or downwards. It was first gathered by Schomburgk, and again by Appun, and has not yet been discovered outside the Colony.

20. *L. tenuis*, Klotzsch.—Stipites very slender, 1-3 in. l.; wiry, brownish-black, polished, naked; fronds erect, bipinnate, 4-6 or more in. l.  $1\frac{1}{2}$ -3 in. w.; the upper part simply pinnate; pinnae in distant opposite (or the lower alternate) pairs, spreading horizontally, 1-2 in. l. 2-3 or 4 li. w.; terminal pinnae longer and wider than the lateral; segments dimidiate, subovate, pointed, the base cuneate, about  $1\frac{1}{2}$  li. l. 1 li. or less broad, three slender short veins in each; sori short, or continuous along the upper margin and casually turning the point.—*L. filiformis*, Hk. Sp. Fil. vol. 1, t. 63. D.

Guiana, Roraima, Schomburgk, n. 1185.—A peculiarly slender species with very thin highly polished very dark coloured rachises. The segments form a partial lobe toward the base on the upper side. The habit is rather like that of *Cheilanthes pauper-cula*, but more lax.





TRIBE VI.—*Adiantææ*.

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SORI marginal; linear, oblong, lunate, reniform or roundish, inserted on the innerside of the reflexed cartilaginous or corneous margin, which forms the involucre.

The characteristic feature of this tribe is found in the absence of a special involucre, the sori being borne on the innerside of the changed cartilaginous inflexed margin, which is folded back against the underside of the leaflets, thus reversing while folded the general direction of the sporangia in relation to the surface of the fronds. The members, too, though varying greatly, possess in common a strong family likeness, and form one of the most natural and best marked tribes in the Order.

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GENUS XI.—*Adiantum*, Linn. Only genus. Characters as in the Tribe.

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This genus is well known as comprising the popular and commercially valuable maiden hair ferns, a term applied to all the species of the *Capillus-veneris* type, with which species it first originated. They have usually polished black or chestnut stems and rachises, with more or less dimidiate, flabellate or equilateral leaflets, which have no central rib. As in *Lindsaya*, where the leaflets are dimidiate, *i.e.*, apparently half cut away, the fructification is only along the superior, and sometimes the outer margin. The genus occupies both shady and open situations equally, abounding most at low altitudes, ascending from sea level, but gradually decreasing in the higher ranges, up to 3,000 or 3,500 ft. alt., where its appearance terminates, within the range of this flora.

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Fronds pinnate, flagelliform and radicans at the end.

1. *A. lunulatum*, Burm.

Fronds pinnate or in part bipinnate; pinnæ sub-equilateral; sori continuous.

2. *A. deltoideum*, Swartz.
3. *A. lucidum*, Swartz.
4. *A. dolosum*, Kze.
5. *A. Phyllitidis*, J. Sm.
6. *A. Wilsoni*, Hook.
7. *A. macrophyllum*, Swartz.

Fronds pinnate or bipinnate; leaflets sub-dimidiate or dimidiate; sori continuous.

8. *A. Kendalii*, Jenm.
9. *A. dissimulatum*, Jenm.
10. *A. oyapokense*, Jenm.
11. *A. villosum*, Linn.
12. *A. pulverulentum*, Linn.

Fronds pinnate or bipinnate; leaflets inequilateral at the base; polysorus along the opposite margins.

13. *A. denticulatum*, Swartz.
14. *A. obliquum*, Willd.
15. *A. fovearum*, Radd.
16. *A. intermedium*, Swartz.

Fronds uniformly bipinnate; leaflets dimidiate; polysorus along the upper margin and generally round the end.

17. *A. glaucescens*, Klotzsch.
18. *A. hirtum*, Klotzsch.
19. *A. tomentosum*, Klotzsch.
20. *A. macrocladum*, Klotzsch.
21. *A. fructuosum*, Spreng.
22. *A. cayennense*, Willd.
23. *A. tetraphyllum*, Willd.
24. *A. triangulatum*, Hook.
25. *A. obtusum*, Desv.

Fronds tripinnate, rarely simply pinnate, leaflets dimidiate, polysorus, (rarely monosorus) along the upper side and usually round the end.

26. *A. melanoleucum*, Willd.
27. *A. nigrescens*, Fée.
28. *A. pumilum*, Swartz.
29. *A. cristatum*, Linn.
30. *A. striatum*, Swartz.
31. *A. pyramidale*, Willd.
32. *A. crenatum*, Willd.

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1. *A. lunulatum*, *Burm. var. delicatulam. Mart.*—Stipites tufted, 1-2 in. l., very slender, dark castaneous, polished, with a few minute deciduous scales scattered at the base, with which also the slender upright rootstock is clothed; fronds spreading, simply pinnate, 3-6 or 8 in. l.  $\frac{3}{4}$ -1 in. w., terminating in a naked flagelliform radicate tail; rachis filiform; pinnæ distant, alternate, on slender filiform pedicels, which are articulate, varying from ovate to suborbiculate, the base cuneate,  $\frac{1}{4}$ - $\frac{1}{3}$  in. diameter, naked, bright green, thin, pellucid, the outer margin freely dentate, and incised; veins fine, very close, repeatedly flabellately forked; sori in few short oblunar patches, one to each incision on the outer margin.—Hook and Grev. t. 104.—*A. arcuatum*, *hv. A. tremulum, Kze, A. filiforme, Gardn., Hook Ic. Pl. t. 503. A. flagellum, Fée.*

Guiana.—A slender simply pinnate plant, spreading in habit, and rooting, producing new plants, from the naked tail-like end of the rachis. It is very variable in size, and the largest state, which is the type, is several times larger than this variety, but is also exceedingly variable.—Brasil, Trop. Asia, Africa and Australia.

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2. *A. deltoideum*, Swartz. Stipites numerous,  $1\frac{1}{2}$ -4 in. l. castaneous; arising from a rather stoutish elongated fibrous rootstock; fronds 3-7 in. l.  $\frac{1}{2}$ -1 in. w., simply pinnate or with one to several very short pinnate branches at the base, firm, naked or the slender rachis slightly ciliate; leaflets deltoid, terminal usually larger, upper approximate, lower subdistant,  $2\frac{1}{2}$ -6 li. w. and d. articulate at the apex of the short filiform pedicel, underside pale, upper dark green; sori continuous (rarely interrupted) along both margins and usually round the slight basal auricles; veins free, flabellate, repeatedly forked, fine, close.

Var. *A. jamaicense*, Fée.—Stipites and rachises rather flexuose, fronds 6 in. or over, l.,  $1-1\frac{1}{2}$  in. w.; leaflets fewer, larger,  $\frac{1}{2}-\frac{3}{4}$  in. each way, sub-deltoid, rather rounded; sori interrupted, in patches around the margin.—Fée Fil. Ant. t. 33, f. 3.

Jamaica.—Abundant on the rocky north coast, and in stone walls, often within wash of the sea spray, gathered at St. Ann's Bay, Ocho Rios, Port Antonio, St. Thomas and elsewhere. A very distinct species, with no close ally. The margins of the triangular little leaflets are straight and the angles acute. In the var. *A. jamaicense* the stipites and rachises are more or less flexuose, pinnæ much fewer, larger, and rounded, the larger occasionally incised, and the sori uniformly in short patches. I have seen a fasciated form of the type gathered by Miss Harding in Jamaica.—Cuba, Haiti, San Domingo.

3. *A. lucidum*, Swartz.—Rootstock rather stout, shortly repent; stipites sub-tufted,  $\frac{3}{4}-1\frac{1}{2}$  ft. l., those of the barren fronds shorter, finally naked, polished, very dark, fronds  $\frac{3}{4}-1\frac{1}{2}$  ft. l., 3-6 in. w., with a terminal pinna and several or many spreading lateral ones, rarely bipinnate at the base, dark glossy green, paler beneath, firm in texture, rachis rustyiliate; pinnæ shortly stipitate, lanceolate-acuminate, the inferior base shortly cut away, the superior truncate and square with the rachis or often rounded, 2-4 in. l.,  $\frac{1}{3}-\frac{7}{8}$  in. w., those of the barren fronds larger and finely serrate; veins very oblique, fine, close, forked, casually uniting; sori continuous, along both margins, falling a little short of the faintly serrate point.—Hook Sp. Fil. vol. 2. t. 79. c.

Jamaica, Trinidad, Tobago.—A very distinct and instantly recognised species, allied to *Phyllitidis*, yet possessing very numerous pinnæ, but associated with the polysorus, *obliquum* by Grisebach and other authors, from which it is absolutely distinct. I always feel loth to give up a Jamaica Swartzian species, for Swartz gathered his plants himself in the forests, fields and wayside, and he was a most careful worker, and generally right. Grisebach refers Sloanes tab. 55. fig. 2, Herb. plts. p. 130 to this, but as I have verified from the actual plant in the Brit. Mus., it is *A. Kendallii*, Jenm. I have seen no records from the other islands.—Panama to Brasil.

4. *A. dolosum*, Kunze.—Stipites erect, from a shortly creeping, castaneous, scaly rootstock,  $\frac{1}{2}-1$  ft. l., polished ebeneous, yet slightly rusty-furfuraceous; fronds simply pinnate,  $\frac{1}{2}-\frac{3}{4}$  ft. l., and nearly as wide; rachis rusty-furfuraceous and coloured like the stipe; pinnæ spreading, distant or subdistant, stipitate, lanceolate or linear-lanceolate, acuminate, subcordate or rounded or subcuneate at the base, 3-4 in. l.  $\frac{1}{2}-\frac{3}{4}$  in. w., long-tapering outwards, subcoriaceous, dark olive green, paler beneath, naked; midrib very slender at the base, evanescent outwards, barren margins dentate; veins close, curved, repeatedly forked, and anastomosing, forming linear oblong angular areolæ; sori continuous (or sometimes interrupted) along both margins, but not reaching the point; involucre narrow.—Hook. Sp. Fil. vol. 2, t. 79. B.

Guiana.—This hardly differs from *A. Phyllitidis* except in the more free areolation of the veins, which, too, is a very variable character. In the shape and size of the pinnæ it is not very distinct also from *A. lucidum* but they are fewer in this—about half the number—and the venation of that differs from *Phyllitidis*, and the fronds are constantly once pinnate only.—Brasil.

5. *A. Phyllitidis*, J. Smith.—Rootstock creeping, thick as cord, rusty scaly; stipites erect, 6-10 in. l., rusty with fine scaly pubescence, as are the rachis and short costæ; fronds about as wide as long, with a large entire terminal pinna and two to four similar lateral ones; pinnæ stipitate, lanceolate-acuminate, 3-5 in. l., 1-2 in. w., obliquely

cuneate at the base; subcoriaceous, dark green and glossy above, paler beneath, naked; veins fine, close, two to three times forked, casually uniting; sori continuous, along both margins falling short of the apex but nearly reaching the base on the superior side.—Hooker's sp. Fil. vol. 2. t. 72. B.

Guiana.—Widely spread over the greater part of the colony, in forests. This is just intermediate between *Wilsoni* and *lucidum*. From the latter the fewer and larger pinnæ distinguish it; while from the former it differs by the narrower pinnæ, which are unequally cuneate at the base, and one or two more to each side. The veins in this also casually unite, thus connecting it with the *Hewardia*. The midrib passes the base into a diminishing vein.—Venezuela, Peru.

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6. *A. Wilsoni*, Hookr.—Rootstock creeping,  $\frac{1}{8}$ – $\frac{1}{6}$  in. thick; stipites a span to  $1\frac{1}{4}$  ft. l., dark, polished; fronds composed of a terminal equilateral pinna, 3–5 in. l. and  $1\frac{1}{4}$ –2 in. w. lanceolate or ovate-lanceolate, acuminate, and 1–2 pair of similar, spreading, lateral ones, which are petiolate and broadly rounded at the base, naked, glossy, firm; midrib evident at the base beneath, beyond which it is evanescent; veins fine, close, oblique, twice or thrice forked, casually uniting; sori continuous along both margins, falling short of the serrated apex.—Hook. Sp. Fil. vol. 2. t. 72. A.

Jamaica.—Plentiful in very damp situations in forests near rivers among the lower hills of the eastern parishes; gathered abundantly on the banks of Ugly River, St. Mary and St. Thomas-in-the-East and St. Georges. The lateral pinnæ are usually somewhat subcordate at the base, being deeper on the lower side. It is allied to the mainland *A. dolosum*, Kze., which has narrower and more numerous, leathery, pinnæ. I have seen no record from any other island, though probably it inhabits the two great neighbouring countries, Cuba and San Domingo.

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7. *A. macrophyllum*, Swartz.—Stipites a span to  $1\frac{1}{4}$  ft. l., dark, polished, tufted on a rather stout, short, fasciculate, finely scaly rootstock; fronds  $\frac{3}{4}$ – $1\frac{1}{4}$  ft. l., 5–9 in w., naked, glossy, passing from a delicate pink to green, composed of a terminal pinnæ and 4–8 pair of opposite or alternate similar lateral ones, which are subovate or lanceolate 2–4 in l., 1–2 in. b. acute or more tapering and acuminate, sessile or shortly stipitate, the base broadest and truncate or oblique on the lower side, the basal 1–2 pair casually expanded and auricled or subsagittate, margins entire, serrate, or inciso-lobate, no distinct midrib, or none evident beyond the base beneath; veins fine, close, repeatedly forked, free, flabellate; sori continuous along both margins, falling little or much short of the apex.—Hook. Icon. t. 132.

West Indies generally, from Cuba to Trinidad.—A lowland forest species not ascending much above a thousand feet altitude, and a well-known and very distinct species. The young fronds are of a beautiful reddish pink-tinge, turning green eventually. There are two distinct forms: the first with relatively short, wedge-shaped pinnæ, with the margins beyond the sori entire and even; the second with longer more acuminate pinnæ, which are inciso-lobate beyond the fertile sides. It was first collected by James Harlow, from whom Sloane's specimen in his herbarium, p. 76, mounted with *A. Kaulfussi*, Kze. was obtained in Jamaica. A frond is found, rarely, on the same rootstock as the normal pinnate ones bipinnate at the base. I have only seen one such in a quarter of a century, and that Jamaica. Baker's var. *bipinnatum* is a distinct species, *A. Kendalii*, Jenm.

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8. *A. Kendalii*, Jenm.—Stipites  $\frac{1}{2}$ – $1\frac{1}{2}$  ft. l., polished, black, subtufted from a shortly repent fasciculate finely scaly rootstock; fronds firm, naked, paler green beneath,  $\frac{1}{2}$ –1 ft. l. simply pinnate, or with one



to several pair of short, equally developed, lateral pinnate branches at the base; segments of the terminal pinnate portion subdimidiate; the upper and lower margin parallel in the superior ones, but the former longer,  $1\frac{1}{4}$ - $1\frac{1}{2}$  in. l.  $\frac{1}{3}$ - $\frac{3}{4}$  in. w., the inferior ones rhomboidal or subdeltoid, those of the basal branches smaller and quite dimidiate oblong or subfalcate, the terminal large and rather elongate-acuminate; veins fine and close, repeatedly forked free; sori continuous along the upper margin, and in the terminal simply pinnate portion also down the oblique outer edge, the barren points faintly denticulate.—Sloane t. 55 fig. 2.

Jamaica.—Infrequent, but plentiful where found, in the eastern parishes, gathered on woodland slopes about a quarter mile on the Annotto Bay side of Castleton Gardens, and by Sloane at Archers Wood and other inland woody parts of the island. Sloane's specimen is a fragment, with most of the segments removed but it shows the bipinnate state at the base. The top only where it is perfect, was figured. Its more developed states show that it belongs to the *villosum* group of dimidiate species. It is named after a former Superintendent of Castleton Gardens who next found it 185 years after Sloane.

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9. *A. dissimulatum*, Jenm.—Stipites erect,  $\frac{3}{4}$ - $1\frac{1}{2}$  ft. l., black, polished; fronds erect,  $1$ - $1\frac{1}{4}$  ft. l., 5-10 in. w., bipinnate, firmly chartaceous, naked, dark green, consisting of a long central pinnate portion and two to three basal, much smaller, spreading, pinnate branches; rachis and costæ like the stipites; leaflets apart or contiguous, sessile, deltoid-rhomboidal on the central branch, varying to oblong or ovate-oblong in the inferior ones of the lower branches, the terminal elongated; veins free, fine, close, flabellate, repeatedly forked; margins dentate when barren; sori continuous around all but the basal and interior margins.—Gard. Chron. Dec. 1st, 1894.

Jamaica, Bull Head, Clarindon, 3,000 ft. alt. collected by Mr. Hart. Resembling in general habit *A. Kendalii*, but with different shaped pinnules, firmer texture, striated surface, and different arrangement of the sori.

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10. *A. oyapokense*, Jenm. n. sp.—Rootstock stoutish, shortly repent, finely scaly; stipites clustered, articulate at the base with a few fine brown scales there, slender, erect, ebeneous, channelled, slightly furfuraceous at first, 2 ft. l.; fronds bipinnate, erect, with a long terminal pinnae 6-8 in. l., 2 in. w. and 1-2 short lateral ones on each side 2-4 in. l.,  $1\frac{1}{2}$  in. w., chartaceous, dark glossy green, glaucous beneath; rachises ebeneous and brightly polished; segments sub-rhomboidal, spreading apart, truncate on the superior and shortly cut away on the inferior base, the outer part uniformly broadly rounded, the lower subrotund,  $\frac{3}{4}$ -1 in. l.,  $\frac{1}{4}$ - $\frac{1}{2}$  in. w., a few minute scales beneath; margins even but crinkled here and there; veins free, fine, forked, close; sori continuous around all but the inferior base.

Cayenne, gathered by Leprieur on the Oyapok in 1835. In habit the fronds resemble the branched forms of *obliquum* with the colour of *denticulatum*. Its distinguishing features are the long slender stipes nearly four times as long as the fronds, articulated at the base, the broadly rounded pinnules, entire margins which though having a pucker here and there are not cut, and the unbroken sori. I have been unable to find that it has been named before in Leprieur's plants, which were dispersed unnamed.

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11. *A. villosum*, Linn.—Rootstock strong, repent, fasciculate, densely scaly, stipes strong, tetragonal, 1-2 ft. l., channelled, polished, black, decidedly rusty-furfuraceous; fronds bipinnate,  $\frac{3}{4}$ - $1\frac{1}{2}$  ft. each

way, firm, glabrous, both sides dark green, upper glossy; pinnæ spreading, 3-6 to a side, and a similar long terminal one  $\frac{1}{2}$ -1 ft. l.  $1\frac{1}{2}$ -2 in. w.; segments contiguous, very numerous,  $\frac{2}{3}$ -1 in. l.  $2\frac{1}{2}$ - $4\frac{1}{2}$  li. w. dimidiate or subdimidiate, margins straight, upper and lower parallel, the former longer forming an acute or bluntish point with the oblique outer one, denticulate when barren, rachis and costæ rusty-pubescent; veins fine, repeatedly forked, free; sori along the upper and down the outer margins where it terminates in a slight spur, continuous or rarely disconnected by a slight projection in the line of the upper margin.—Sloane t. 55 fig. 1. *A. falcatum*, Swartz.

Var. *A. oblique-truncatum*, Fée.—Margins of segments undulated, and sori interrupted thereby.—Fil. Ant. t. 7. fig. 3.

Throughout the West Indies from Cuba to Trinidad.—Frequent in woods, and half open and grassy situations, and in hedges, among the lower hills up 1,200 or 1,500 ft. alt. A large robust plant, which only differs from *tetraphyllum* by its continuous sori and rather firmer texture. The variety which is marked by the marginal undulations is somewhat thinner in substance, and is less frequent.—On the Mainland from Panama to Brasil.

12. *A. pulverulentum*, Linn.—Stipes strong, 1-2 ft. l., channelled, polished, blackish, deciduously rusty-scurfy, arising from a shortly creeping scaly rootstock; fronds bipinnate, subcoriaceous, bright green on both sides, the upper glossy, 1- $1\frac{1}{2}$  ft. l. and nearly as w., glabrous, except the rachis and costæ which are rusty-pubescent; pinnæ spreading, 6-8 in. l., about 1 in. w., 4-8 to a side, with a similar terminal one; segments very numerous, close dimidiate, subfalcate or straight,  $\frac{1}{2}$ -1 in. l. 2- $2\frac{1}{2}$  li. w. the under margin usually upcurved and denticulate at the end; veins free, close, repeatedly forked; sori usually continuous, extending partly or wholly along the upper margin.—Plum. t. 55.

Var. *caudatum*, Jenm.—Fronds nearly twice as long as wide, terminal pinnæ nearly twice as large as the lateral, the upper of which are the largest, those below being gradually shortened; segments subfalcate; sori not reaching the end.—*A. serrulatum*, Linn., Sloane t. 35, fig. E. *Bull. Bot. Dept. Jamaica, no. 33: 7. 1892*

General from Cuba to Trinidad, Tobago and Guiana.—Very plentiful in woods and forests up to 1,000 or 1,500 ft. alt. When the segments are falcate, the sori fall short of the end, when they are straight it reaches the end and often extends quite round the truncate or decurved outer margin. In rare instances it is broken up into short patches. One of the best marked and individualised species. It appears to be uniformly bipinnate in the West Indies, but in Guiana it is frequently tripinnate, the lower pinnæ being shortly branched at the base. The variety is found on wet rocks in Jamaica near springs, and is common. It is well marked by the large terminal pinna and short lateral ones, while in the type the lateral pinnæ are as long as the terminal. Mexico to Brasil and Peru.

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13. *A. denticulatum*, Swartz.—Rootstock fibrillose; stipes 4-10 in. l. slender, channelled, polished, black, quite naked eventually; fronds pinnate, 6-10 in. l., 3-5 in. w. base truncate, dark glossy green above, bright glaucous beneath, thin, naked or the slender rachis slightly ciliate; pinnæ composed of 4-8 pair and a similar terminal one, alternate, close or subdistant, 2-3 in. l.,  $\frac{3}{4}$ - $1\frac{1}{4}$  in. w. subequilateral, the inferior base cut away, the superior rounded and generally somewhat expanded auricle-like, the apex acuminate: veins free, fine,

close, very oblique, repeatedly forked; sori intermittent, extending from the base along both margins but not reaching the finely serrated apex.—*A. Kaulfussii*, Kze., Hook. and Grev. Icon. Fil. t. 190.

West Indies generally and Guiana.—Frequent in moist woods and forests bordering streams and rivers at low altitudes. The sori are close or a little apart, the margin often slightly notched between, forming shallow curves, extending partly at least around the basal auricle which overlaps the rachis. The relatively large pinnae, bright glaucous underside, and uniformly simply pinnate habit well mark it from its allies. Rarely a frond is found with one or two branches at the base, that on the right the longer, the left often absent. I follow continental Botanists in restoring the Swartzian name of the validity of which there is no question.—Mexico to Brasil and Peru.

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14. *A. obliquum*, Willd.—Rootstock short-creeping,  $\frac{1}{4}$  in. thick, fibrillose; stipes 6-10 in. l., deciduously furfuraceous, dark, polished, channelled; fronds simply pinnate or with a single or pair of short and usually unequal pinnate branches at the base, firm, dark green on both sides, the upper with a satin-like gloss, naked except the rachis which is rusty furfuraceous; segments  $1\frac{1}{4}$ -2 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. w., about 8-12 to a side, subequilateral, the inferior base cut away obliquely, the superior expanded and rounded, barren finely denticulate; veins free, close, forked, oblique; sori interrupted, close, extending along both margins from the base to the acuminate or blunt point.—Hook. Sp. Fil. vol. 2. t. 79. A. Plum. t. 52.

West Indies generally and Guiana.—Frequent in forests and shady places near streams and rivers at low elevations. Marked by its simply pinnate, or sparsely branched, habit, dark green colour on both sides and satiny gloss above. From allied species it may be told at once by its short much stouter rootstock.—Venezuela and Columbia.

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15. *A. fovearum*, Radd.—Rootstock free-creeping, slender as cord, slightly scaly; stipites erect, 9-15 in. l., deciduously rusty and ebeneous polished; fronds either simply pinnate, or with a long pinnate terminal pinna and 1-3 similar spreading on each side, which are 6-8 in. l. and 2-2 $\frac{1}{2}$  in. w.; pinnulae in the bi-pinnate form  $1\frac{1}{4}$ -1 $\frac{1}{2}$  in. l. 4-5 lines deep, but twice as large in the simply pinnate state, and obtusely oblong-lanceolate, acuminate or the inferior more rounded, subequilateral, often or the inferior side cut away  $\frac{1}{4}$ - $\frac{1}{2}$  the length and thence upcurved outward to the point; the inner parallel with the costa and often somewhat auricled, chartaceous, naked, bright green on both sides, satiny above; rachis and costae rusty-ciliate; barren pinnulae inciso-serrate; veins free, fine, repeatedly forked, midrib absent or very slight; sori extending along the upper margin and half or two-thirds down the under in patches 1-2 li. l.

*A. var. reductum*, fronds smaller, pinnæ 4-5 in. l.,  $1\frac{1}{4}$ -1 $\frac{1}{2}$  w., pinnules  $\frac{3}{4}$ -1 in. l.,  $\frac{1}{4}$  in. w. obtuse.

Guiana, very abundant in forests on the Corentyn River, literally covering the forest floor. All the intermediate states may be gathered from the simply pinnate to the large ample fronds with three pair of spreading pinnate pinnæ. The former state resembles exactly in the frond *A. obliquum*, differing only by its more slender and freely creeping rootstock, upon which the stipites are scattered; the other states differ only from *intermedium* by both sides being quite green alike. Both Grisebach and Baker unite it with *intermedium*, but the absence of the glaucous colour beneath, and the satiny gloss of the upper surface, as in *obliquum*, sufficiently distinguishes it. The pinnate state in which the leaflets are 2-3 in. long there is often a distinct but slender midrib from which the veins spread on each side which is absent in the bipinnate state.—Brasil.

16. *A. intermedium*, Swartz.—Rootstock thick as cord, free-creeping, densely scaly; stipes scattered,  $\frac{3}{4}$ -1 $\frac{1}{2}$  ft. l., deciduously rusty-furfuraceous, as are also the rachis and costæ, dark polished, channelled; fronds bipinnate, subcoriaceous, green above, glaucous beneath, composed of a long terminal pinna and 1-2 pair of similar horizontally spreading lateral ones, which are 5-8 in. l. 2-2 $\frac{1}{2}$  in. b.; segments numerous, 1-1 $\frac{1}{4}$  in. l.  $\frac{1}{4}$ - $\frac{1}{2}$  in. b., blunt or acute, naked, subequilateral, the inferior base more or less freely cut away in a curved or straight line, the superior fully developed and rounded, barren margins denticulate; veins free, very oblique, repeatedly forked; sori interrupted, close, extending fully along the upper, and down the under margin to the point where it is cut away.

General throughout the West Indies and Guiana.—Very abundant, chiefly in grassy half shaded situations at low elevations; probably the commonest species of all. Distinguished from its allies by its equally and uniformly branched habit, glaucous under surface, and free-creeping rootstock. Fully developed plants have two pinnæ on each side of the fronds, but in an early stage they are fewer, one, or two on one side and one on the other, there is a Guiana state, much smaller, with uniformly oblong rounded pinnules, and with short-creeping rootstocks.—Mexico to Brasil and Peru.

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17. *A. glaucescens*, Klotzsch.—Stipites erect, a foot or more long, slender, ebeneous, naked and very brightly polished; fronds composed of few or several alternate pinnæ on each side and a similar rather larger terminal one, which are 5-7 in. l. 1 $\frac{1}{4}$ -1 $\frac{1}{2}$  in. w., petiolate to  $\frac{1}{4}$  or  $\frac{1}{2}$  in., subdistant, membrano-chartaceous, naked, glossy, dark green above, glaucous beneath, rachis and costæ highly polished and very slender; pinnulæ contiguous, 12-18 to a side dimidiate, the lower ones reduced and subflabellate, the terminal largest, lobed and elongato-deltoid, the rest 8-10 li. l. and 3-4 li. w. within where they are much the broadest, the end rounded, the under margin straight-curved; veins fine, repeatedly forked; sori lax, 4-8 to a pinnule, forming short patches on the shallow lobes along the upper margin and round the end.—Hook. Sp. Fil. p. 26. Hooker and Baker Syn. Fil. p. 118.

Guiana.—Gathered first by Schomburgk and of late years abundantly on the upper Demerara river on the banks of the great falls. A very distinct plant. The habit is very lax, and the framework of the fronds and the petioles very slender, and highly polished and ebeneous, as in the true maidenhair section. The lower pinnules are stipitate, and all are deciduous in the course of time.

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18. *A. hirtum*, Klotzsch.—Rootstock shortly repent, scaly; stipites approximate, erect,  $\frac{1}{2}$ -1 ft. l. slender, deciduously rusty tomentose; fronds bipinnate, composed of 2-7 pairs of spreading contiguous lateral pinnæ 3-6 in. l. and a similar terminal one, chartaceous, dark-green above rather glaucous beneath, rachis and costæ freely hairy; pinnulæ ciliate or naked, close, 1-2 dozen to a side, the outer linear-oblong, dimidiate, 5-6 li. l. 1 $\frac{1}{2}$ -2 li. br., the lower reduced and cuneate-flabellate, barren evenly serrated; veins forked, radial, sori minute, roundish or reniform, contiguous.—Hook Sp. Fil. vol. 2, t. 82, A.

Jamaica, Trinidad and Guiana.—A widely spread and quite characteristic species, of which two forms are prevalent in Trinidad the Guianas and Brazil in one of which scattered hairs occur on the disk of the leaflets, while in the other they are absent. The sori are very small and close, from 10-20 to a segment. It is the smallest species of this section.—Panama to Brasil and Peru.

19. *A. tomentosum*, Klotzsch. — Rootstock shortly creeping, rather stoutish and ligneous, clothed with small subulate brownish scales; stipites strong, erect, subangular, rusty puberulous while young, 1-2 ft. l.; fronds large,  $1\frac{1}{4}$ -2 ft. w. and nearly as l., with a long terminal pinna and 4-7 similar, rather distant, lateral ones, naked, slightly striated beneath, dark green, chartaceous, rachis and costæ rusty-puberulous; pinnæ spreading, the lower ones petiolate, 9-12 in l.  $1\frac{1}{2}$ -2 in br., pinnate; pinnulæ  $\frac{3}{4}$ -1 in. l. 4-5 li. br., very numerous, close, oblong dimidiate, subsessile, the inferior margin plain the upper and outer faintly serrulate when barren; sori copious, minute,  $\frac{1}{4}$ - $\frac{1}{3}$  line long, extending along the upper and around the outer margins; veins spreading, two or three times forked, *A. Klotzschianum*, Hook. Sp. Fil. 2, p. 21. Tab. 82, C.

Guiana.—Infrequent in forest, but widely distributed over the alluvial forest region but chiefly on the higher ground which crops up through it here and there. It is by far the finest of the local species of the dimidiate group. The name is very inapplicable, as the fronds are quite glabrous, only the rachis and costæ being rather rusty. At first sight it suggests more a *Lindsaya* than an *Adiantum*. The pinnules from parallelograms with the corners rounded, except the inferior ones which are reduced and subovate. They are very numerous (from 25-35 or more to a side) and close together. The sori are the smallest of any species, from 15-25 to each pinnule, and they extend round the curved superior base as well as the rounded outer end. The lateral pinnæ are 5-7 in number  $1\frac{1}{2}$ -2 $\frac{1}{4}$  inches apart, and spread right and left nearly horizontally so that the fronds are  $1\frac{1}{2}$ -2 ft. w., with an equally long terminal pinna. At the base they are stipitate from  $\frac{1}{4}$ - $\frac{1}{2}$  in., the terminal segment linear-acuminate.—Surinam, Cayenne, Brasil.

20. *A. macrocladum*, Klotzsch.—Stipites creeping, ligneous, knotted, finely brown scaly, beset with the bases of part stipes in a double series; stipites stiffly erect, strong, 10-20 in. l., angular, ebeneous, slightly polished, rusty-furfuraceous, rachises and costæ, densely dark brown hairy; fronds bipinnate, 10-15 in. l., about 1 ft. w., chartaceous, exceedingly dark coloured on both sides and very glossy, composed of a terminal pinna and 3-5 similar alternate lateral spreading ones 5-8 in. l.  $1-1\frac{1}{4}$  in. w., sharply dentate at the linear apex; segments very numerous, close, oblong, rounded,  $\frac{1}{2}$  in. l.  $2\frac{1}{2}$ -3 li. b., the base truncate, a few deciduous scales beneath; veins very fine, forked; sori brightly auriferous, in close very short round patches along the upper and outer margins which when barren are cut into broad deeprounded teeth.—Hook. Sp. t. 83. fig. B.

Guiana.—Common in certain forests. A very distinct and beautiful species. The colour is so dark that the plants look almost black among the herbage in heavy frost. No other species is nearly so dark. Hooker's figure excellently represents it. There is a variety with the margins deeply cut and the sori on the tips of the lobes, apart, like projecting beads along the margins, the pinnules being not rounded but much longer and acuminate, the colour equally dark.—Brasil and Peru.

21. *A. fructuosum*, Spreng.—Rootstock ligneous, short, knotted and fasciated, densely finely scaly; stipes 1-2 ft. l. angular, channelled, black, clothed with dark furfuraceous tomentum; fronds bipinnate,  $1-1\frac{1}{4}$  ft. l. and nearly as w., firm, dark green and glossy above, paler beneath, rachis and costæ densely rusty-furfuraceous; pinnæ spreading, apart, about 5 to a side, with a similar long terminal one, 5-8 in. l.  $1-1\frac{1}{4}$  in. w.; segments numerous, close dimidiate, oblong, rounded at the end, the base truncate, barren denticulate, 5-8 li. l.  $2-2\frac{1}{2}$  li. b., the lower ones reduced, terminal small, often minute, or elongated

and linear; veins fine, free, close, repeatedly forked; sori numerous, close, small, extending along the upper and round the outer margins.

Jamaica, Trinidad, Guiana.—Marked by its densely furfuraceous stipes, rachis and costæ, a few slight scales often appearing on the underside of the segments, dark dull glossy colour, and uniform, copious small sori, which extend quite round to the end of the basal margin. It comes nearest to *macrocladum* and *obtusum*. The mainland species of the *obtusum* and *tetraphyllum* groups were nearly all named by the continental European Botanists, and much confusion exists in herbaria, books, and among workers and students as to the identity of the types.—Venezuela to Brasil and Peru.

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22. *A. cayennense*, Willd.—Rootstock slender, free-creeping, scaly; stipes strong, erect angular, ebeneous, scurfy 10-20 in. l., rachises, &c., similar; fronds bipinnate, chartaceous, bright green, glossy, with a terminal pinna and several long sub-distant similar, spreading lateral ones with a linear sharply dentated or serrate apex,  $1\frac{1}{2}$ -2 in. w. 6-10 in. l.; segments oblong, rounded or acuminate, numerous, contiguous, 2-4 li. w.  $\frac{1}{2}$ -1 in. l., truncate at the base, the upper and outer margins freely dentate when barren; veins close, fine, forked; sori in short patches along the upper and round the outer margins, separated by incisions.—Griseb. Fil. Brit. W. I. I., page 664.

Cuba, Jamaica, Trinidad and Guiana.—A highly variable species ranging varying forms from *tetraphyllum* on one hand to *obtusum* on the other. Its distribution is as wide as its variation. I possess abundant material from all the countries named; those from Cuba gathered by Linden and determined by continental botanists. Hooker's figure, Species Fil. vol. 1. tab. 61 A. & vol. 2. p. 20. quoted by Grisebach is typical *tetraphyllum*.—Brasil and Peru.

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23. *A. tetraphyllum*, Willd.—Rootstock repent, scaly; stipes strong, angular, channelled, 1-2 ft. l. polished, black, at first coated with deciduous rusty tomentum; fronds bipinnate,  $1\frac{1}{4}$ -2 $\frac{1}{2}$  ft. l. nearly or quite as wide, subcoriaceous, both sides dark green, upper glossy, rachis and costæ rusty-furfuraceous, other surfaces glabrous; pinnæ 3-6 to a side, with a similar long terminal one  $\frac{1}{2}$ -1 ft. l.  $1\frac{1}{2}$ -2 in. w., subdistant; segments numerous, subdimidiate, oblong or lanceolate-oblong,  $\frac{1}{2}$ -1 in. l.  $\frac{1}{4}$ - $\frac{3}{8}$  in. w. contiguous but frequently the lower somewhat reduced ones becoming more remote, parallel margined, but the superior side  $\frac{1}{3}$ - $\frac{1}{4}$  longer, forming with the straight oblique outer margin an acute or roundish point, barren serrulate, terminal linear elongated; veins free, fine, repeatedly forked; sori interrupted, short extending along the upper and round the outer margins.—*A. Cayennense*, Willd. Hook, Sp. Fil. vol. 1., tab. 61. & vol. 2, p. 20.

West Indies generally and Guiana.—Infrequent in woodland and forest, and in shady situations generally. A large species, with wide spreading pinnæ, not so coriaceous, but, as mentioned under that species, closely resembling *villosum* in size of frond and form of segments, differing by the interrupted sori. The framework too is not so strong, and appears weak for so large a plant.

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24. *A. triangulatum*, Hook., Griseb. (non Kaulf).—Rootstock short-creeping, scaly; stipes 1-1 $\frac{1}{2}$  ft. l. deciduously rusty-scurfy, black, polished, channelled, angular; fronds bipinnate, 9-10 in. l. and as much w., firm, dark glossy green above, light green beneath, glabrous except the rachis and costæ which are rusty-scurfy; pinnæ 2-4 to a side with a similar or rather larger terminal one, contiguous, often upcurved, 6-8 in. l.  $1\frac{1}{4}$ -1 $\frac{1}{2}$  in. w., segments numerous, close,

dimidiate, oblong or linear-oblong,  $\frac{3}{4}$ -1 in. l. 2-3 li. w., blunt and rounded at the outer end, the upper and lower margins nearly parallel, but the latter slightly decurved at the base, inferior ones much reduced, the terminal linear, attenuated, sterile denticulate; veins free, repeatedly forked, fine, close; sori a li. or less l., contiguous, extending along the upper margin and usually round the blunt end.—Grisebach's Flora, p. 664.

*Var. acuminatum.*—Segments longer, upcurved or subfalcate, acuminate or acute, the end usually barren and inciso dentate.

West Indies generally and British Guiana.—Frequent in woodland and forest. The pinnæ being few and close, the fronds are very short in relation to the long petioles, which disproportion gives them a characteristic appearance. As in a few other instances, the petioles are 4-sided at the base and 3-sided above. The species is a well marked one, and is widely and plentifully spread through the West Indies, Guiana with hardly the least variation. The variety has exactly the same range, preserving a similar unity of character. Specimen from Grenada gathered by Sherring were referred by Baker to *A. prionophyllum*, H.B.K., but so many species have been referred to the latter that I am doubtful what it is. If it be true, however, the name has priority and is therefore the proper name to use. As to the plant itself there is no uncertainty of its being a distinct and well marked species.—Throughout Tropical America.

25. *A. obtusum*, Desv.—Rootstock shortly repent, densely scaly; stipites tufted,  $\frac{1}{2}$ -2 ft. l., naked or furfuraceous, dark brown or black and polished, angular and channelled, rachises and costæ similar; fronds erect, bipinnate, firmly chartaceous, naked both sides alike, or the under olive-green,  $\frac{1}{2}$ -1 $\frac{1}{4}$  ft. l. 4-9 in. w.; pinnæ distant, erectopatent, shortly stipitate, 3-9 to a side and a similar terminal one,  $\frac{3}{4}$ -1 in. w. 3-6 in. l.; segments oblong, dimidiate, fairly close, numerous, rounded, the inferior half cut away or nearly so, the upper base truncate, 3-5 li. l., 2 $\frac{1}{2}$  li. w., striated, the upper and outer margin crenated, the barren denticulate; veins free, forked, very fine; sori in short patches  $\frac{1}{2}$  li. l. around the superior and outer margins.—Hook. and Grev. Icon. t. 188.

West Indies generally and Guiana.—A stiff medium-sized species, with relatively small segments, uniformly rounded at the outer end. It is less hard in texture, though stiff and firm, than any of the striatum group and in the typical states is well individualised and varies little. I only possess these from Trinidad and Guiana.—Panama to Brasil and Peru.

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26. *A. melanoleucum*, Willd.—Rootstock shortly repent, fasciculate, densely scaly; stipes  $\frac{1}{2}$ -1 $\frac{1}{4}$  ft. l. slender or strong, dark, channelled, naked, slightly asperous or not; fronds bi tri-pinnate, 1-1 $\frac{1}{2}$  ft. l. 8-10 in. w., chartaceous, dark green on both sides, upper rather glossy, rachis and costæ slender, polished, blackish, naked; pinnæ spreading or erect-spreading, 3-8 to a side, with a similar long terminal one 3-8 in. l.  $\frac{3}{4}$ -1 $\frac{1}{4}$  in. w., the inferior ones branched at the base or not, segments close, numerous, dimidiate, curved or sublunate, rarely straight, 5-8 li. l., 2-3 li. w., oblong, usually rounded at the end, barren finely dentate; veins free, radiating, repeatedly forked, fine, close; sori reniform or crescent-shaped, extending along the upper and decurved outer margin, with shallow incisions between. Plum. t. 96. *A. cubense*, Hook. Sp. Fil. vol. 2. t. 73. a.

Var. *nanum*, Jenm.—Fronds very delicate, pinnate or rarely bipinnate at the base, 2-3 in. l.  $\frac{3}{4}$ -1 in. w.; segments 6-10 to a side with a larger subdeltoid or somewhat elongated terminal one.

Jamaica.—Abundant in different parts from sea level up to 1,000 or 1,500 ft. alt., preferring wet calcareous rocks and banks. Very variable, there being apparently three or four distinct forms. The largest state is tripinnate at the base, and of this Plumier's figure is a good representation. Hooker's *cubense*, which is simply pinnate, was probably founded on an undeveloped plant. Apparently there are one or two forms uniformly bipinnate only smaller than the large state mentioned. The variety *nanum* which was gathered plentifully on the dripping perpendicular banks of St. George's spring, Chesterfield, St. Mary, is a delicate little plant, two or three inches long, including the filiform stipes, simply pinnate as a rule with relatively large segments and copious sori. The shape of the segments vary in different forms. In some the upper margin is decurved, the under being lunate; in others the upper margin is hollow and the under upcurved. In the former the sori extend round the outer margin; in the latter they are confined to the upper margin only.—Cuba, Haiti, San Domingo, Porto Rico.

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27. *A. nigrescens*, Fée.—Stipes 5-8 or more in. l. black polished, channelled, slightly scaly at the very base; fronds bi-tripinnate,  $\frac{3}{4}$ -1 ft. l.  $\frac{1}{2}$ - $\frac{3}{4}$  ft. w. firm, dark dull green, striated, rachis and costæ polished, glabrous, or slightly rusty-puberulous; pinnæ spreading nearly horizontally, 3-4 or more to a side, subdistant or distant, shortly petiolate,  $3\frac{1}{2}$ -6 in. l. 1-1 $\frac{1}{4}$  in. w. the lowest usually shortly bipinnate at the base segments numerous, contiguous or close, subdimidiate, rather widest at the base; the upper edge much longer than the lower, forming with the oblique outer edge a blunt or acute point, denticulate, slightly pedicellate,  $\frac{1}{3}$ - $\frac{3}{4}$  in. l. 2-3 li. w., terminal largest, subdeltoid, equilateral, rather elongated, lobed or incised at the base; veins fine close, repeatedly forked, radiating; sori contiguous, small, slightly concave; occupying the centres of the slight lobules of the upper and probably also of the outer margins.

Jamaica.—Infrequent, collected by Miss Taylor, who gives no locality, but probably on the Port Royal or Portland mountains where she resided with her parents at Old England Coffee Plantation. The specimen agrees exactly with a type specimen of Fée's in the Kew Herbarium, and is a very distinct species, but Fée's figure, Icon. t. 11 fig. 2 appears to be a variety of *A. striatum*, Swartz, and is certainly not the same plant. *A. nigrescens* has the striated surface of this group, but with smooth brightly polished black stipites, rachis, and costæ, and hair-like similarly black and polished short pedicels to the segments. Its nearest affinity is with *crenatum*, which however is much more robust.—Guadeloupe.

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28. *A. pumilum*, Swartz.—Stipes slender, 1 $\frac{1}{2}$ -3 in. l. polished, rusty or naked; fronds simply pinnate, or the base bipinnate, the former  $\frac{1}{3}$ - $\frac{3}{4}$  in. w. the latter 1-2 in. w. firm, naked, dull glossy and faintly striated above; segments few or several to a side, alternate, oblong, subdimidiate, rounded or subovate, 2-4 li. l. 1 $\frac{1}{2}$ -2 li. w., barren finely denticulate terminal narrow, lobed at the base, inferior subdistant; veins free, radiating, fine, close, forked; sori close; short, subreniform or roundish, around the upper margins.

Jamaica.—“Rare on shady rocks and old trees.”—Swartz. The above description is chiefly taken from Swartz's specimens in the British Museum, aided by larger bipinnate ones of my own that appear to be the same. There are six little fronds in all of Swartz's; only one of which is fertile, three segments of which bear a simple sorus each, about a third of a line wide. The stipites are 1-1 $\frac{1}{2}$  in l. fronds simply pinnate, 2 in. l.  $\frac{1}{2}$ - $\frac{3}{4}$  in. w., segments 6-8 to a side, the lower ones orbicular-cuneate the upper ovate-cuneate, the terminal rather elongated and bluntish. A doubtfully distinct species, probably some member of the striatum group in young state.



29. *A. cristatum*, Linn.—Rootstock short-creeping, finely scaly; stipes  $\frac{1}{2}$ -1 ft. l., dull blackish, rough surfaced; fronds tripinnate,  $\frac{3}{4}$ -1 $\frac{1}{2}$  ft. l.  $\frac{2}{3}$ -1 ft. w., rigid, hard, coriaceous, dark dull green beneath, glossy above and striated, naked, or the dull coloured rachis and costæ slightly rusty; pinnæ 5-8 to a side with a terminal similar one, approximate or subdistant, 5-8 in. l.  $\frac{1}{2}$ - $\frac{3}{4}$  in. w., the lower 1-3 pair branched at the base on one or both sides; segments numerous, close, dimidiate, 3-5 li. l. 2 li. w., the lower edge upcurved, the upper usually straight subfalcate, or slightly decurved, the end generally acute, but occasionally blunt, not denticulate; veins free, forked, close, fine; sori confined to the upper margin, subcontinuous or in two or more contiguous elongated oblong or short patches.—Sloane Cat. p. 21; Hist. p. 95, Herb. p. 131.

Jamaica.—Common in similar situations to the last, but at a higher elevation, extending from 1,000 to 2,000 or 2,500 alt., plentiful among the hills between Gordon Town and Guava Ridge and in all that region of St. Andrew, and on limestone ground generally through the island. Possessing the texture and general character of *striatum* but with more decidedly dimidiate segments and scant often elongated sori confined to the upper margin. In fructification the fronds pass from a single to several sori to each segment, being generally uniform in the possession of one or the other.—Cuba to the French Islands.

30. *A. striatum*, Swartz. — Rootstock short-creeping, densely scaly; stipites  $\frac{3}{4}$ -1 $\frac{1}{4}$  ft. l. naked, dull blackish, rough surfaced, fronds stiff, tripinnate at the base,  $\frac{3}{4}$ -1 $\frac{1}{4}$  ft. l. 6-10 in. w., the substance hard and rigid but not thick, dull dark green, the upperside rather glossy and much striated, rachis and costæ dull, stiff, though relatively slender, the latter slightly scurfy; pinnæ erect-spreading, 4-7 in. l.  $\frac{1}{2}$ -1 in. w. contiguous or subdistant; segments very numerous, close, subdimidiate, oblong, or the lower ovate or subrhomboidal,  $\frac{1}{4}$ - $\frac{1}{2}$  in. l. 1 $\frac{1}{2}$ -4 or 5 li. w. rounded, blunt or acute, flat or concave, barren crenate dentate; veins free, flabellate, repeatedly forked; sori contiguous, extending along the upper and outer and turned shortly also on to the under margins—Plum. Fil. t. 97.

Var. *a*. Habit very lax,—pinnæ 2 in. apart; segments contiguous, hardly close, texture stiff but less rigid.

Var. *b*. Fronds smaller, bright green, compact, segments close, 2-3 li. l. 1 $\frac{1}{2}$  li. w., the outer minute, terminal linear-elongate,  $\frac{1}{2}$ - $\frac{3}{4}$  in. l.

Var. *c*. Habit and size of the type, but segments elongated and acutely or bluntly pointed the inferior more uniformly subrhomboidal.

Var. *d*. Fronds larger; leaflets larger and uniformly rhomboidal, nearly as deep as long, glaucous beneath; sori apart 1-2 li. l. sublunate.

Jamaica.—Very abundant on stony well drained ground in woods and on open banks and cliffs up to 1,000 ft. alt. or more. The branches of the lowest pinnæ are occasionally, but rarely, again shortly branched, making the frond quadripinnate. Vary variable. In the type the habit is more or less compact, the segments rounded and about two-thirds as broad as long. Var. *a*. has similar segments, often however more uniformly oblong, the habit very lax. Var. *b*. is the most distinct, of smaller size, compact habit, very tapering pinnæ and bright rather grass green colour. This is apparently the plant figured by Fée as his *A. nigrescens* (Icon. t. 11. fig. 2). In var. *c*., which is as large as the type, the inferior segments are more uniformly subrhomboidal, those next above elongated and pointed though generally blunt, the sori extending down half or two-thirds of the outer and inferior margin. Var. *d*. is a very handsome, stately plant, with sori as in *melanolenicum*. I have only Cuban specimens of it. Swartz's type specimens are in the British Museum.—Cuba, Haiti, San Domingo.

31. *A. pyramidale*, Willd.—Stipes erect, dull, dark, naked except at the rough surfaced base; fronds bitripinnate, lax, 1-1½ ft. l. 8-10 in. w. stiff, naked, dark dull green beneath, glossy above, faintly striated, rachis and costæ slender, dull, blackish, the latter slightly rusty; pinnæ erect-spreading, alternate, several to a side, with a similar, usually longer, terminal one, 6-8 in. l. ½-¾ in. w., tapering to the point, the lower 1-2 pair branched, petiolate, segments very numerous, close, dimidiate, 2-6 li. l. 1½-2 li. w., lower margin upcurved, upper usually falcate or sub-falcate, acuminate or acute, the margins not toothed; veins free, forked, radiating, fine, close; sori confined to the upper margin, often a solitary elongated patch in the hollow of the segment, or variously interrupted. Plum. Fil. t. 54. *A. microphyllum*, Klf.

Jamaica.—Gathered at Stony Hill, St. Andrew, where it grows in the open and in light woodland with *cristatum*, of which it seems to be hardly more than a variety marked by the long narrow pinnæ and small falcate acuminate segments. The slender pinnæ, of which the upper ones are often much the longest, hang down of their own weight. The segments are variable, some being short, falcate and acute, with the sori extending nearly to the point of the upper margin, while the majority are elongated and acuminate, the sori being confined to the inner half of the margin. As regards both this and *cristatum* some fronds might be placed in the polysorus and others in the monosorus groups.—Cuba, Haiti, San Domingo.

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32. *A. crenatum*, Willd.—Stipes strong, black, polished, a few scales at first at the base; fronds 1-1½ ft. l. nearly the same w., triquadripinnate, chartaceous, naked, light rather glossy green, striated, rachis and costæ channelled, polished black, very slightly rusty at first; pinnæ forming several alternate pairs, the lower large and compound, the upper reduced and simply pinnate, with a similar terminal one 1½-2 in. w.; segments subdimidiate, shortly pedicillate, contiguous, ½-1 in. l. 2-5 li. w. oblong and obtusely pointed or many subrhomboidal, terminal subdeltoid or elongated; veins free, fine close, repeatedly forked, radiating; sori copious, occupying the shallow lobes or crenatures formed by the uniform incisions of the upper and outer margins.—Plum. Fil. t. 53. *A. Wilesianum*, Hook. Sp. Fil. vol. 2. t. 83. C.

Jamaica.—Infrequent or local, gathered by Wiles and Lambert and a few years ago by Hart, at Bull Head. There are specimens at Kew from both the former, and very fine ones from Wiles in J. Smith's ferns in the British Museum. The short pedicels of the segments are hair-like.—West Indies and Mexico.

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(To be continued.)

33. *A. concinnum*, H. B. K.—Stipes tufted, 4-9 in. l., dark chestnut brown or blackish, deciduously scaly at the very base; fronds lanceolate-oblong, pendent, 1-1 $\frac{3}{4}$  ft. l. 4-9 in. w., tripinnate, papyraceous-herbaceous, naked, pale green, rachis and costæ polished, costulæ filiform; pinnæ numerous, erecto-spreading, approximate or the inferior subdistant, 3-6 in. l., 1-2 $\frac{1}{2}$  in. w., gradually reduced to the top of the frond, almost sessile by the presence of a reduced leaflet near the axil of the costæ and distant from the next above it; leaflets, except the terminal, (which, too, are largest), nearly sessile, not articulated, flabellate-cuneate, 2-6 li. w. and d., the sides of the base equal or unequal, the outer margin inciso-lobate, barren denticulate; veins free, flabellate, repeatedly forked; sori approximate, rather rounded, obreniform, 1-2 to each marginal lobe; involucre pale, deeply reniform.

West Indies generally.—Abundant in situations distant from each other on wet and dry rocky banks. The habit is pendent; the fronds, which are regularly and copiously pinnate and have a beautiful pinkish tinge before maturity, hanging one over the other. Usually, the pinnæ are deeper on the under than the upper side. The stipes are fragile and easily broken, though not particularly slender.—Mexico to Brazil and Peru.

34. *A. Capillus—Veneris*, L.—Stipites slender, polished, dark brown or ebeneous, terete, a few inches to a foot l.; fronds oblong or ovate-lanceolate, bi- or tri-pinnate, all parts petiolate,  $\frac{1}{2}$ -1 ft. l., 3-6 or 8 in. w., lower pinnæ much the shape of the fronds; leaflets mostly flabellate-cuneate, or some of the lateral varying toward sub-rhomboidal,  $\frac{1}{4}$ - $\frac{3}{8}$  in. w. and d., the outer margin rounded and deeply incised, not articulated with the slender pedicles; veins fine, flabellate, forked; sori transversely subreniform or lunate, as long or not as the lobes are wide; involucre firm but membranaceous.—Hook, sp. Fil. t. 74 B. (a simply pinnate state) Grisebach p. 666, Eat. Fer. N. Am. Pl. 37.

Jamaica, Dominica, and Trinidad.—This is readily distinguished from its allies by the more decidedly cuneate-flabellate segments, and their want of articulation with the pedicel, the latter being an unmistakable character. It varies considerably in size and shape, passing from simply pinnate (the fronds not longer than one's finger) to tripinnate, the fronds reaching a foot long. I have verified the West Indian specimen gathered in Cuba, Jamaica (Pedro Cave, St. Ann's Parish), St. Vincent, and Trinidad, possessing the characteristic unjointed pedicels.—Spread throughout the temperate and tropical regions of the Northern Hemisphere.

35. *A. bellum*, Moore.—Rhizome creeping, as thick as a quill; stipe naked, castaneo-ebeneous, 6-9 in. long; frond ovate-deltoid, tripinnate, glabrous, 6-9 in. long; pinnæ erecto-patent, lowest the largest, deltoid more produced on the lower side, end segments regularly deltoid,  $\frac{1}{3}$ - $\frac{1}{2}$  in. broad; lateral ones shortly petiolate, cuneate-deltoid,  $\frac{1}{3}$ - $\frac{1}{2}$  in. l. and w.; barren portion of margin sharply toothed; sori 2-3 to a tertiary segment, reniform, 1 $\frac{1}{2}$  li. l., varying from as broad as deep to 3 times as broad as deep; indusium glabrous, persistent.—Gard. Chron. 1879, vol. 1, p. 172, fig. 24.

Bermuda, Lefroy, Mosely, Farlow.—Allied to *cuneatum* and *fragile*. This was ascribed to the former in Bulletin No. 25 of the United States Natural History Museum, "Contributions to the Natural History of the Bermudas," by General Sir J. H. Lefroy, F.R.S., formerly Governor of the Bermudas.

36. *A. fragile*, Swartz.—Stipes slender, 1-8 in. l., tufted, naked, polished, dark; fronds ovate, quadripinnate,  $\frac{3}{4}$ -1 $\frac{1}{4}$  ft. l. 4-7 in. w., papyraceous-herbaceous, naked, green on both sides, rachises dark, polished; pinnæ erect-spreading, petiolate, lowest pair not much the largest, the simply pinnate upper ones extending to near the apex of the frond; segments very deciduous, orbicular-cuneate, 4-7 li. d. and w. the outer margin rounded, very slightly incised, the dark filiform pedicels 1-1 $\frac{1}{2}$  li. l. and jointed at the top; veins free, flabellate, fine, repeatedly forked; sori slightly obreniform, contiguous, around the outer margin, with slight notches between.—Hook. Icon. Pl. t. 965 a.

Jamaica.—Very plentiful on calcareous rocks below 2,000 ft. alt. in many parts of the country. The species is peculiar for shedding all its leaflets in dry weather, leaving nothing to show the presence of the plants but the stems and branches. Herbarium specimens, however carefully dried, drop their leaflets in the same way. This character, the ovate fronds much longer than broad, hardly enlarged basal pinnæ, rounded segments, with the margin only slightly incised, well mark the species. It was first gathered by Sloane, who, however failed to discriminate it from *tenerum*, with which it is mounted in his herbarium, only four leaflets remaining on the fronds.—Cuba to the French Islands.

37. *A. Bessonia*, Jenm.—Rootstock strong, ligneous, shortly repent, knotted, fasciated, branches divergent, minutely furfuraceous-scaly; stipites in tufts, strong, stiffly erect, with a few fine pale scales in the earliest growth, bright, shining black, as are all the vascular parts, quadrato-terete, 5-7 or 8 in. l.; fronds quadripinnate, stiffly erect, roughly deltoid in out-line, forming an equilateral triangle, the base and sides being of equal length, 6-9 in., texture firm but membranous, colour at first pale yellowish, finally dark green, all parts naked, translucent and clear; pinnæ same shape, lowest pair largest, tripinnate, 3-4 in. w., 4-5 in. l., petiolate to 1 in. l.; segments densely crowded and imbricated to the extent that they lie several deep over each other, the outer concealing the under in pressed specimens, flabelliform, the outer subdeltoid,  $\frac{1}{2}$  in. w. and d., more or less, the fertile notched between the sori, barren, freely lacerated all round, pedicels  $\frac{1}{2}$ -1 li. l., articulate at the top; sori very copious,  $\frac{1}{2}$ -1 li. l., separated by the marginal incisions, involucre the same size, corneous, sublunate; veins free, fine, flabellate, repeatedly forked.—*A. Bessonianum*, Hort. O'Brien, Gard. Chron. 1896, xx. Kew Bulletin, Appendix II, 1897.

A remarkably characteristic species owing to its rigid habit and the dense congestion of its fronds. It is only recorded from Trinidad, where it was found by Mr. Hart under cultivation in the garden of the lady after whom it is named.

38. *A. littorale*, Jenm. n. sp.—Stipes tufted, polished, ebeneous or dark chesnut, slender, 5-10 in. l.; fronds tripinnate,  $\frac{1}{2}$ -1 ft. l. nearly as w. papyraceous-herbaceous, clear green, naked, rachis slender, polished; pinnæ spreading, lower largest and most compound, upper simply pinnate, all parts freely petiolate; segments deciduous,  $\frac{1}{2}$ -1 in. b. and d. varying from rhomboidal to flabellate-cuneate, the outer margin usually rounded, and freely incised, the incisions deeper in the barren fronds, pedicels hair-like 1-1 $\frac{1}{2}$  li. l. articulated at the top; veins free, flabellate, fine and close, repeatedly forked; sori

oblong or subreniform, varying in length as the lobes of the margin vary in width.

Jamaica.—Very abundant on the rocky cliffs of the coast, in some places within wash of the sea spray. The freely and deeply incised margins give this a close resemblance to *Capillus veneris*, from which it is however clearly distinguished by the articulation of the segments, which are almost as deciduous as those of *fragile*. It is generally a smaller plant than *tenerum*, which in general habit it resembles, the segments larger and much more deeply cut, the incisives being from 1-3 li. d. In my Jamaica Fern Flora, on a false identification of a specimen received, I accepted this with great doubt, as “*A. emarginatum*, Bory. Wild,” an Eastern species, with round even edged leaflets, merely notched here and there and bearing no resemblance to the large deeply incised leaflets of this—Porto Rico.

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39. *A. tenerum*, Swartz.—Stipes tufted, erect, polished, ebeneous.  $\frac{3}{4}$ -1 $\frac{1}{4}$  ft. l., slightly scaly at the base; fronds 1-1 $\frac{1}{2}$  ft. l. and w. quadri-pinnate, chartaceous, dark green, naked, rachises polished, black, slender; pinnæ much the same shape as the fronds, spreading lowest largest, all divisions freely petiolate; segments, some obliquely flabellate-cuneate, others rhomboid dimidiate,  $\frac{1}{4}$ - $\frac{3}{4}$  in. w. and d. on articulated filiform pedicels 1-2 li. l., base unequally cuneate, outer margin cut into shallow uniform lobules; veins free, flabellate, fine and close, repeatedly forked; sori more or less contiguous, oblong or occasionally rather subreniform, between the marginal incisions.—Eat. Fer. N. Am. pl. 124.

The Bahamas and the greater part of the West Indies.—Abundant on limestone banks and on old ruins of coffee and other properties, from sea level up to 3,000 ft. alt. The outline of the fertile margin of the segments is not even, and by a sharp incision on each side forms three inconspicuous lobes; there being fainter incisions or slight notches between as well. The general habit is lax and spreading. This is the commonest species of the typical maiden hair group. *A. rigidulum*, Mett., which is ascribed to Jamaica, Porto Rico, St. Thomas and St. Croix by Urban, I have not seen. It is said to be intermediate between *tenerum* and *fragile*.—Widely spread on the tropical and sub-tropical mainland.

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40. *A. subcordatum*, Swartz.—Stipites erect, 1 $\frac{1}{2}$  ft. l. or more, strong, polished, dark castaneous or blackish, terete, clothed at the very base with fine brown scales; fronds ample, erecto-spreading, tri-quadri-pinnate, rachises polished, dark or ebeneous terete; lower pinnæ 10-15 in. l. and nearly as w., deeper and more compound on the lower side; leaflets sub-distant or contiguous, ovate-acuminate, broadest at the rounded equal base, 1-2 in. l.  $\frac{2}{3}$  to over 1 in. w, chartaceous, pellucid, naked; pedicels filiform,  $\frac{1}{4}$ - $\frac{1}{2}$  in. l., articulate at the top; veins free, close, much forked, flabellate; sori in continuous roundish or oblong patches along both the converging lateral margins, which are incised only to the depth of the sori; involucre subreniform or oblong, 1 or 2 to each incision.—H.K., Sp. 2 p. 34. *A. betulinum*, Kef.

Guiana.—Cumaka Mountains. Gathered by Appun in 1364. Exactly the size and habit of *trapeziforme* but the leaflets differently shaped, and equilateral, with no distinct central vein, and the involucre less corneous. In some states the leaflets are cordate at the base, but generally they are rounded, the margins are even or very slightly crenate.—Brasil.

41. *A. cultratum*, J. Smith.—Stipes strong, erect, polished, black; fronds tri-quadri-pinnate, 1-1½ ft. l. and w, firmly chartaceous, naked, bright green on both sides, the upper glossy and finely striated, rachises polished and black; pinnae spreading, lower compound, upper simply pinnate; segments sub-dimidiolate, pedicillate, approximate, ¾-1¼ in. l. ¼-½ in. w. oblong-rhomboidal, terminal and basal ones deltoid-rhomboid, the under margin plain the upper and outer incise-lobate, parallel, straight or decurved, terminating in an acute bluntish or rounded point, the sterile finely denticulate; veins free, close, fine, radiating, repeatedly forked; sori one to each lobule of the upper and outer margins; involucre deep, rounded, corneous.—Plum. Fil. t. 95.

Jamaica.—Infrequent, gathered by Syme near Castleton, St. Mary, Jamaica and by Macrae in St. Vincent. Resembling *trapeziforme*, but with much smaller more oblong, rounded segments, in which the interior base is rather rounded and laps over the slender rachis, and the pedicels are not articulate at the top.—San Domingo, St. Catherine's, Brasil.

42. *A. trapeziforme*. Linn.—Stipes erect, tufted, 1½-3 ft. l., strong, black, polished, with a few deciduous scales at the base; fronds ample, spreading, 1½-2½ ft. l. and w., usually broader than deep, tri-quadri-pinnate, naked, firmly chartaceous, bright green and glossy above, pale or rather glaucescent beneath, rachises flexuose or zigzag, polished, black; pinnae distant, spreading, the lowest largest and most compound, with the branches on the inferior side longest, the next above less developed, simply pinnate; segments subdimidiolate, 1-1½ in. l., ½-¾ in. w., on black filiform pedicels 3-4 li. l., upper and lower margins straight or curved, nearly parallel, the outer more or less oblique and forming with the upper an acute or acuminate point, both incise-lobate, terminal and basal segments the same shape; veins free, radiating, fine, close, repeatedly forked; sori contiguous along the upper and outer margins, as wide and deep as the marginal incisions; involucre deep, rounded, corneous.—Sloane t. 59.

Jamaica.—Common in shady situations and light woods below 1,500 feet altitude, extending from the eastern to the central and western parishes. The stipites are stiffly erect, but the fronds spread rather flatly. In small plants the habit is pedato-ternate, the central not much exceeding the lateral branches. By far the largest plant in the genus amongst the species represented in the West Indies and the Guianas.—Cuba to the French Islands, and from Mexico to Brazil.

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43.—*A. malaliense*, Jenm.—Rootstock terraneous, prostrate, repent, closely biserially knotted, clothed with densely imbricated bruneous fine scales; stipites serial, not articulated, erect, angular, bare in time at the base, nigrescent, brightly polished, above rusty-tomentose 6-9 in. l.; fronds erect, a span or more long and broad, bipinnate, very dark olive green, subcoriaceous, naked, except on the rachis and costæ, which are densely rusty-furfuraceous, consisting of a terminal pinnate portion, with an entire ovate lanceolate, and acuminate, terminal segment much like the contiguous lateral ones, and with one to three similar basal spreading pinnate branches, usually of lesser size, but otherwise mostly conform; pinnules 2-3 in. l. ½-¾ in. w., oblong-lanceolate acuminate, obliquely rounded at the sessile, or shortly stipitate, base, the inferior side of which is very shortly cut away, margin bidentate, the teeth appressed in the faintly

serrate groups; veins fine, close, very oblique, repeatedly forked, few anastomosing, excurrent; sori along the upper and lower edges, divided every  $\frac{1}{4}$  in. by the primary incisions of the margins.—Gard. Chron. Aug, 15th, 1896.

Guiana, at the Greater Malali, the Great Falls of Waterton's "Wanderings."—The habit is exactly that of *A. Kendalii* Jenm. of Jamaica. This is a very interesting plant, of a totally different habit to the others of the small section, *Hewardia*, which hitherto has contained only three species, all from Guiana and all growing together where this was found.

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44. *A. Hewardia*, Kunze.—Stipites stout, stiffly erect, 1-1 $\frac{1}{2}$  ft. l., fleshy, stout as a quill, a translucent plain colour; fronds simply pinnate, bi- or tri-partite with one to three spreading pinnate branches about 1 ft. l. 8-9 in. w.; lateral leaflets large, 3-4 to a side, with a similar terminal one, ovato-oblong or ovate-lanceolate, acute or acuminate, sub-equilateral, the base cuneate or obliquely-cuneate, petiolate, 3-6 in. l.  $1\frac{1}{2}$ -2 $\frac{1}{4}$  in. b., very dark green above, pale beneath, naked, chartaceous; when dry, rachises and pedicels channelled, polished, slightly rusty furfuraceous; midrib black beneath. evanescent toward the end, veins reticulated, forming copious angular oblique meshes; sori continuous along the lateral margins; involucre narrow.—*Hewardia adiantoides*, J. Smith in Hook. Journ. Bot. 3, p. 432, t. 16, 17. and 4 p. 161, Hook. Gen. Fil. t. 89. *Pteris melanopus*, Le Priewe MSS.

Guiana.—Infrequent on the Demerara River. The simply pinnate states resemble somewhat *A. Phyllitidis* and *A. dolosum*, but are thinner with broader parts, and a pedate habit is assumed by the spreading branches, all of the same size, in the larger states. This character and the copiously reticulated venation, upon which the genus *Hewardia* was founded by J. Smith, and, more than all, the thick, fleshy, stiffly upright, amber coloured petioles—a feature unique, and that has no parallel in the genus, and none quite like it elsewhere in the Order—distinguish it. Though standing so stiffly upright, the stems give under the pressure of finger and thumb. The vascular bundles are two, distinctly apart, in the interior. In drying, the petioles lose their unique character, and shrink to the size and likeness of the ordinary species.—Cayenne.

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45. *A. olivaceum*, Baker.—Rootstock creeping, horizontal, slightly scaly, beset with the bases of past stipites on the upper side, and densely with descending roots on the under; stipites few, erect, polished, ebeneous,  $\frac{3}{4}$ -1 $\frac{1}{2}$  ft. l. naked; fronds  $\frac{3}{4}$ -1 $\frac{1}{2}$  ft. each way, composed generally of three pinnate branches, a central and two lateral erecto-spreading, one on each side, or these branches again branched in the same manner: leaflets equilateral, lanceolate-acuminate, 3-4 in. l.  $\frac{3}{4}$ -1 in. w., the base equally cuneate, obliquely-cuneate or the inferior ones rounded, 3-6 to a side to each branch, with a similar but rather larger terminal one, which is sometimes bi- or tri-foliate, naked, chartaceo-membranous, and pellucid, olive green, the margins cut into shallow even but rather curved lobes  $\frac{1}{4}$ - $\frac{1}{2}$  in. w. midribs prominent at the base, but evanescent outwards, and, with the pedicels, which are  $\frac{1}{4}$ - $\frac{1}{2}$  in. l., and rachises, polished brightly ebeneous; veins fine, very oblique, repeatedly forked, and forming within linear-oblong, or oblong meshes, the inner series of which are largest, the small final branches running into the margins free; sori linear, along both of the converging lateral margins, but generally not extending to the acuminate outer part, as long or

hardly so long as the width of the lobes; involucre narrow, firm.—Hooker and Baker, Syn. Fil. p. 127.

Guiana.—Very common in certain situations across the whole forest region. A beautiful plant, of the habit of *A. Le Priouri*, but with larger, strictly equilateral, leaflets with a distinct midrib at the base and more open and more freely anastomosing venation, and broader more distinctly curved marginal lobes. The petioles and rachises are rather slender, and fragile in texture, and the latter have sometimes a slight rusty deciduous puberulencescence.

46. *A. Leprieuei*, Hook.—Rootstock shortly repent, ligneous, rooting from beneath, dark brown scurfy with fine scales at the growing end; stipites erect, 1-1½ ft. l., polished, ebenous, naked, fronds lax, spreading, 1¼-1¾ ft. l., 1 ft. w. pedatiform; principal divisions usually three, two lateral and one central, on petioles 1½-2 in. l., lower inferior branch of the lateral pinnæ branched again at the base on the inferior side, all petioled; leaflets 1-2 in. l., 6-7 li. w., stipitate to 1-3 li., variable in shape, rhomboidal, but the upper ones more or less obliquely attenuate-acuminate and the inferior flabelliform, terminal ones subcandate, chartaceous, both surfaces naked, olive-green; rachis and costæ puberulous above; veins spreading, forked several times, casually uniting; sori in 1-3 li. patches extending along the upper and under margins to the point at which the latter is cut away, absent from the attenuated outer part, as long or nearly so as the width of the shallow marginal lobes.—Hook. Sp. Fil. vol. 2. t. 82. B.

Guiana.—Common, like *olivaceum*, from one side of the colony to the other on similar ground, and often in the same situations. The normal pinnules are subdimidiate, but others vary more or less from this form to lanceolate-attenuate. All are broadly expanded on the superior base, and completely cut away on the inferior. It could only be confounded with *olivaceum*, but the equilateral pinnules of that clearly distinguish it. The superior base is rounded and soriferous, and the sori extend about half way or more down the outer inferior margin to the point where it is cut away. The marginal incisions are ½-1 line deep.

#### TRIBE VII.—*Pteridæ*.

SORI marginal, linear, and continuous, or in short, oblong, reniform or roundish patches; involucre more or less the same shape as the sori; inflexed, formed of the membranous margin of the frond or segment, or special and membranous or cartilaginous, attached exteriorly, free interiorly; sporangia stipitate, with an incomplete vertical jointed ring, eventually bursting transversely; fronds varying much in form and size and degree of cutting, but mostly compound or decomposed, rarely entire; veins free or anastomosing.

This Tribe includes of West Indian and Guiana genera:—*Hypolepis*, *Nothochlæna*, *Cheilanthes*, *Pellæa*, *Plagiogyria*, *Lonchitis*, *Onychium*, and *Pteris*. As in *Adiantæ* its members are readily recognised by the sori being marginal and terminal on the veins, or transverse with the summits of few or many veins, together with the exterior attachment of the involucre which consequently open on the interior side, *i. e.*, the side nearer the centre of the leaf or leaflet. In other characters there is great diversity in the Tribe. In *Nothochlæna*, the involucre are merely rudimentary, but their affinity is clearly with *Cheilanthes*. The distribution extends from the Arctic to the Antarctic circles of the Globe.



Sori terminal on the veinlets in the sinuses of the lobes, punctiform, covered by reflexed crenatures of the margins; fronds large and decomposed.—*Hypolepis*.

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Sori as in the next genus, involucre absent, but the margins slightly reflexed; fronds relatively small.—*Nothochloena*.

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Sori terminal on the veins, punctiform and free, but often eventually confluent; involucre inflexed, scale-like and covering only one, or linear and covering several sori; fronds small.—*Cheilanthes*.

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Sori roundish and at first distinct, but soon becoming confluent, continuous along the margin as in *Pteris*; involucre conform.—*Pellaea*.

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Sori roundish on the forked ends of the veins, becoming laterally confluent; involucre special, linear, inflexed over the sori; fronds pinnate, barren and fertile distinct.—*Plagiogyria*.

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Sori linear or elongated, chiefly confined to the sinuses between the final segments or lobes; involucre special, the same shape; fronds large, compound.—*Lonchitis*.

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Sori linear, in sub-opposite pairs in each of the small canoe-shaped final segments, which are barren beyond; involucre special, inflexed, the opposite ones connivent.—*Onychium*.

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Sori linear, transverse with the ends of the veins; involucre special, inflexed the same shape.—*Pteris*.

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## GENUS XII.—*Hypolepis* Bernh.

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SORI marginal, in rounded isolated dots, situated in the sinuses of the ultimate lobes or teeth, terminal on the clavate ends of the lower exterior veinlets, which ends from the receptacles; covered by reflexed crenatures of the margin, which are transformed or not into thin reniform membranes, that form the involucre; fronds large, decomposed, chartaceous or herbaceous; veins free; rootstock in all cases free creeping.

This genus is composed of about a dozen or eighteen species several of which are of very close affinity and of doubtful limits. The affluent size of the fronds and basal situation of the sori in regard to the lobes of the margin on the lower exterior veinlet only are the only characters that separate it from *Cheilanthes*; while, when mature, and the involucre or crenatures of the margin which cover them have been displaced by the matured sori, some of the members can barely be distinguished from *Polypodium rugulosum* and *P. punctatum*, with

which they are quite identical in conformation and habit. I include only the affluent species in which the involucre is formed of crenatures of the margins; species like *H. californica*, Hook, belong strictly to *Cheilanthes*.

- a. Fronds medium sized; unarmed.—1., *H. Purdieana*, Hook.  
 b. Fronds ample, not scandent; armed.—2., *H. repens*, Presl.  
 c. Fronds ample, scandent; armed.—3., *H. nigrescens*, Hook.

1. *H. Purdieana*, Hook.—Rootstock as thick as a quill, free-creeping, dark scurfy; stipes scattered,  $\frac{1}{2}$ -1 ft. l. or more, glandulose—pubescent, chesnut, rather glossy, channelled; fronds herbaceous, dark green, tri or quadri-pinnate, 1-2 $\frac{1}{2}$  ft. l.,  $\frac{3}{4}$ -1 $\frac{1}{2}$  ft. w., ovate-lanceolate, rachis and costæ freely glandulose-pubescent and castaneous, other surfaces also slightly glandulose-ciliate, chiefly the upper on the costulæ and the final ribs, which are flat; pinnæ  $\frac{1}{2}$ -1 ft. l., 2-5 in. w., ovate-lanceolate, opposite, the lowest pair most distant; pinnulæ oblong-lanceolate, pointed, but not acuminately; final segments oblong, dentate or inciso-dentate, 2-4 li. l., 1 $\frac{1}{2}$  li. w., obtuse; sori at the base of the ultimate lobes or teeth, covered at first by a marginal crenature.—Hook. Sp. Fil. Vol. 2, t. 91. B.

Jamaica.—Common on the ridges and peaks above 6,000 ft. alt. A smaller plant than any of the forms of *repens*, very glandulose and sticky when fresh, but not prickly, of dark colour, and broader more dentate and venose final segments. Usually the segments are cut into shallow lobes which are again dentate, and the teeth are carried quite round the margins, as in *nigrescens*, a feature characteristic of both these species as distinguished from *repens*. In large specimens the surface is slightly rough at the base of the stipes, but not actually asperous.—New Granada.

2. *H. repens*, Presl.—Rootstock pencil-thick, free-creeping, scurfy-tomentose; stipes 2-5 ft. l. channelled, stramineous, or darker with a reddish or dark-brown tinge, prickly, puberulous or glandulose-villose beneath; fronds ample, nearly deltoid, tri- or quadri-pinnate, 2-5 ft. l., about the same w. at the base, chartaceous, green, paler beneath, naked or ciliate, sometimes glandulose beneath, rachis and pubescent; pinnæ sub-opposite, the lower 1 $\frac{1}{2}$ -3 ft. l.,  $\frac{1}{2}$ -1 $\frac{1}{2}$  ft. w. or costæ more or less asperous, brown or stramineous, glandulose-more, broader usually on the inferior side; pinnulæ generally sub-distant, lanceolate or oblong-lanceolate; ultimate segments oblong, rounded at the top, faintly or deeply lobed, 3-6 li. l. 1-2 li. w., the lobes faintly serrulate; sori in the hollows of the lobes or lateral teeth; involucre scale-like, pale, cordate.—Hook. Sp. Fil. Vol. 2. t. 90. B; Plum. Fil. t. 12. *Lonchitis*, L., *Cheilanthes*, Klf.

var. *inermis*, Hook.—Stipes and rachises devoid of prickles, bright, or of a clear straw green, and nearly or quite naked.

var. *hostilis*, Presl.—Fronds as large, but cutting finer, final segments 1-1 $\frac{1}{2}$  li. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  li. w.—Hooker and Baker, Syn. Fil. p. 130.

Plentiful throughout the West Indies and Guiana, and widely spread from 2,000-6,000 ft. altitude on the skirts of forests, open banks, and in coffee fields. Varying greatly in prickliness and vestiture, one form being densely aculeate nearly to the top of the rachis and on the lower part of the costæ, and also pubescent and glandulose, and very sticky when fresh; others being only slightly armed, or, like the var. *inermis*, not at all, and more or less naked. The second variety which is much more finely cut, and is common in Guiana and Brazil, was gathered by Purdie in Westmoreland, Jamaica in 1844, and subse-

quently in the eastern parishes by Wilson. Naked, unarmed plants, in which the involucre is not evident, should be compared with *Polypodium punctatum*.—Cuba to Brazil and Peru.

3. *H. nigrescens*, Hook.—Rootstock creeping, dark-scurfy; stipes 2-5 ft. l., naked, dark reddish brown, very prickly, channelled; fronds usually scandent, erect, ascending several feet high, 4-8 ft. w., tri- or quadri-pinnate, glabrous, chartaceous-herbaceous, dark green, rachis, costæ, &c., channelled, (the final parts margined), light or dark brown, very prickly throughout, costæ and costulæ generally flexuose; pinnae lax, distant, opposite, horizontal, 3-5 ft. l., 1-2 ft. w.; pinnulæ  $\frac{3}{4}$ -1 $\frac{1}{4}$  ft. l., 4-8 in. w., all but the basal ones alternate; tertiary segment lanceolate or ovate-lanceolate, acuminate, the quadriary ovate-oblong and blunt, 3-8 li. l., 1 $\frac{1}{2}$ -3 li. b., lobate or deeply pinnatifid, lowest on the superior side largest; sori small, one or more to each lobe on the inferior crenatures of one or both its sides; involucre small.—Hook. Sp. Fil. vol. 2, t. 99, C; Plum. Fil. t. 42.

Jamaica.—Common on the skirts of forests, pushing erect through bushes and young trees, by which its slender parts are supported, from about 2,500-6,000 ft. altitude or more. A peculiar species, possessing the habit of growth of *Davallia aculeata* and *fumarioides*, with, in relation to the very considerable height and spread of the fronds, slender vascular parts. The inferior of the lowest pair (but on the superior side) of the secondary and tertiary segments is conspicuously smaller than the others, or is sometimes entirely absent.—French Islands, Venezuela, Brazil.

### GENUS XIII.—*Nothochlæna*, R. Br.

SORI marginal, terminal on the veins, confluent in a continuous line; sporangia, few to each sorus; involucre none or adventitious, formed of the reflexed margin which exteriorly supports, but does not cover the sori; fronds pinnate or bi-pinnate, and pinnae articulated at the base; veins free, forked, under surface tomentose, felt-like or farinose.

A small genus, represented in the West Indies and Guiana, closely allied to *Cheilanthes*, to which Mettenius referred the species, and occupying similar situations, but differing in habit, and technically distinguished by the adventitious or partial involucre covering to the sori. The affinity to which *Cheilanthes* is otherwise so close, that the involucre may be regarded as simply undeveloped. The capsules are few in each group, so few that, in some instances, they form only a single line along the margins. About forty species are known, two-thirds of which are American, and these range from California in the North to Argentina in the South.

Pinnae oblong, subentire.

1. *N. trichomanoides*, R. Br.

Pinnae linear-oblong or lanceolate, uniformly lobed or pinnatifid.

2. *N. ferruginea*, Desv.

3. *N. scariosa*, Baker.

1. *N. trichomanoides*, R. Br.—Rootstock shortly elongated, fasciate, densely clothed with dark, hair-like, ciliate-edged scales; stipes 2-4 in. l., tufted, numerous, spreading, wiry, chestnut, with few deciduous stellate scales; fronds simply pinnate, linear-lanceolate, prostrate, 6-10 in. l.  $\frac{1}{2}$ -1 in. w., elastic-chartaceous, dark green above and lightly ciliate, beneath densely coated, pad-like, with dark rusty stellate tomentum, and farinose, rachis coloured and clothed like the stipes; pinnae deciduous, 2-5 li. l.  $1\frac{1}{2}$ -3 li. w., apart, subdistant or the inferior remote, the upper cordate-oblong, those below broader and more ovate or deltoid, all expanded, lobed or auricled at the base, entire or sinuate-margined; veins pinnately branched, curved, forked; sori continuous, more or less concealed by the recurved margin and dense tomentum.—Plum. Fil. t. 75.

a. var. *subnuda*, Jenm.—Fronds often larger and more lax; pinnae more oblong, more sinuate or deeper lobed; under surface stellate-ciliate around the margin, the white farinose disk fully exposed, and almost or quite devoid of hair.—Sloane t. 35. fig. 1.

b. var. *pinnatifida*, Jenm.—Fronds similar but rather broader; pinnae ovate-deltoid, the base pinnatifid, 4-5 li. b. sessile the apex broadly rounded and even, within cut half deep into 3-4 rounded lobes  $1-1\frac{1}{4}$  li. w.; vestiture dense brightly ferruginous, turning fulvous at length.

Jamaica.—Frequent between 2,000-4,000 ft. alt. on open rocks and banks in the cleared region of the Southern slopes of the Blue Mountain range. In the type and var. b. the pinnae are so densely tomentose beneath that they look like little hair-pads or cushions, and the farina can only be discovered by removing the tenacious coating. The absence of this coating, and the exposed farina, readily reveal the variety. a. *N. affinis*, Hook., of Cuba, (*Cheilanthes*, Mett.) resembles this in habit, but is more slender, quite free of hairs, and densely coated with white meal.—Cuba, Haiti, Porto Rico.

2. *N. ferruginea*, Desv.—Rootstock shortly elongated, fasciate, bearing small bulb-like buds, which are densely coated with dark hair-like, pale margined scales; stipes 4-6 in. l., tufted, wiry, sub-erect, glossy, chestnut, deciduously tomentose; fronds  $\frac{3}{4}$ - $1\frac{1}{4}$  ft. l.  $1-1\frac{1}{2}$  in. w., pinnate, elastic-chartaceous, grayish tomentose above, beneath densely coated with fine rusty, felt-like tomentum; rachis stiff, rather flexuose, remaining after the pinnae have dropped, coloured and clothed like the stipes; pinnae  $\frac{1}{2}$ - $\frac{3}{4}$  in. l. 2-3 li. b., oblong, spreading, apart or rather distant, the reduced lower ones most so, base truncate, nearly sessile, apex blunt, sides cut  $\frac{1}{2}$ - $\frac{2}{3}$  deep into uniform subdeltoid or oblong lobes, which are  $\frac{1}{2}$ - $\frac{3}{4}$  li. b. and  $\frac{1}{2}$ -1 li. d.; veins pinnate, forked, very oblique, curved, fine, close; sori continuous, partially covered by the recurved margin.—Hook. 2nd Cent. Ferns t. 52; Eat. Ferns N. A. pl. 39. *N. rufa*, Presl; *Cheilanthes*, Willd.

Jamaica.—Frequent over the same region, and altitudinal range as the preceding, common on the banks of waysides diverging among the hills above Gordon Town, St. Andrew. The fertile margins are scarious edged, recurved, involucre like, from which the sporangia protrude, and the matted felt on the underside looks like rusty or brownish scurf. This last feature and the regular toothing or lobing of the pinnae readily distinguish the species.—Haiti, Mexico along the Andes to Peru and Chili.

3. *N. scariosa*, Baker.—Rootstock erect, densely ferruginous, scaly; stipites densely tufted, 1-8 in. l., strong, wiry, polished brown or gray, and densely covered with fulvous scales which are at length more or less deciduous; fronds lanceolate or oblong-lanceolate, 3-6 in. l., 1-2 in. w., little or much reduced at the base, bipinnate, coriaceous, upper side dark green, and nearly or quite naked, under most densely coated with appressed, imbricating, ferruginous or yellowish lanceolate ciliate-edged small scales and wool; pinnæ sessile, spreading, contiguous but not touching, oblong or oblong-lanceolate,  $\frac{3}{4}$ -1 in. l.,  $\frac{1}{4}$ - $\frac{1}{3}$  in. w., the point bluntish, cut down on both sides, nearly or quite at the base, to the midrib, into rounded segments, which are close,  $1\frac{1}{2}$  li w., and the same d.; rachis like stipe; veins concealed: margins scarious-edged, recurved, partly embracing the sori.—Baker, in *Flora Brasil*, p. 539. *N. squamosa*, Fée, Hooker and Baker, *Syn. Fil.* p. 371.

Guiana: Hostman, n. 199, Surinam.—No doubt collected in exposed situations, and probably a high altitude. A small, densely-tufted plant, with broader and more divided fronds than the preceding, most densely coated beneath with ferruginous or yellow wool, over which is superimposed a coat of appressed scales. Except the upper surface, all parts of the fronds are densely clothed.—Mexico to the Argentine territory.

Dr. Christ describes in Urban's *Additamenta Floræ Indici Occidentalis* a new species, *N. asplenoides*, Ch.—resembling *Asplenium Ruta-muraria*, H., of Arctic and Temperate Europe, Asia, and America—from Guadeloupe, collected by Dr. Mazé.

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#### GENUS XIV.—*Cheilanthes*, Swartz.

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SORI marginal, terminal on the veins, dot-like in form, more or less apart and remaining permanently isolated, with similarly isolated, scale-like, involucre covering a single sorus, or close together and eventually confluent, with more or less continuous involucre covering few or several sori; fronds usually small and decomposed veins free.

A genus of moderate size, having its head quarters in central and tropical America, but found sparingly in temperate North America and in the tropical and temperate regions of the other continents of the world. With few exceptions, they are plants delighting in open exposed situations, growing on banks and rocks and other stony and well drained places open to the sun, and are most plentiful in the temperate mountain regions of the tropics. Though so plentiful in America it is chiefly on the western side of the continent from California southward, that they abound. Only one of the species here recorded is common to both the West Indies and Guiana, while in Jamaica all are represented, one being endemic so far as known and two others confined to that island and Cuba only.

a. Sori apart, permanently isolated, each possessing a separate scale-like, subreniform involucre.—*Adiantopsis*, Fée.

1. *C. radiata*, R. Br.
2. *C. paupercula*, Mett.
3. *C. pedata*, A. Br.
4. *C. Reesii*, Jenm.

aa. Sori close, confluent at length, few or several together covered by the inflexed communal involucre.—*Eucheilanthès*.

5. *C. micromera*, Link.

6. *C. microphylla*, Swartz.

7. *C. marginata*, Hook.

8. *C. tomentosa*, Link.

1. *C. radiata*, R. Br.—Rootstock small, fibrous, upright, the crown scaly; stipites tufted, erect slender, stiff, polished chestnut or blackish, often flexuose,  $\frac{3}{4}$ – $1\frac{1}{4}$  ft. l.; fronds bipinnate, firm, dark green, naked, pedatiform, composed of 7–9 tapering pinnæ, horizontally radiating like out-spread fingers from the summit of the stipites, varying in size, the central which is  $\frac{1}{2}$ – $\frac{3}{4}$  ft. l. and  $\frac{3}{4}$ –1 in. w. rather the longest, those on either hand gradually smaller, the inner pair very much reduced, costæ slender, channelled and scariose margined; segments very numerous even—or slightly serrulate-margined, horizontal, close, linear-oblong, 3–5 li. l.  $1\frac{1}{2}$ –2 li. w. apex rounded or acute, base truncate sessile, and slightly auricled on the superior side inferior reduced, the basal ones  $\frac{1}{4}$ – $\frac{1}{2}$  in. distant, and situated in the axils, forming a frill to the top of the stipites; veins oblique, pinnate, branches simple, forked in the basal auricle; sori contiguous, serial, forming a bead-like line around both the base and lateral margins; involucre thin, subreniform—Plum. Fil. pl. 100. *Adiantum*, Linn. *Hypolepis*, Hook. Sp. Fil. Vol. 2. t. 91. a.

West Indies generally and Guiana.—Infrequent but usually common where found, under the shade of forest, on stony ground or rocks, ascending to 1,500 ft. alt. The segments are eventually deciduous, the fronds consisting only of the naked costule, radiating from an excentric axis at the top of the stipites. It was first gathered by Sloane in “woods in the north side of the Island of Jamaica by the Old Town of Sevilla,” Cuba, Mexico to Peru and Brasil.

2. *C. paupercula*, Mett.—Rootstock small, erect, fibrous, the crown scaly; stipites tufted, slender, erect, polished chestnut or black, naked; fronds bi-tri-pinnate, 5–9 in. l. 3–5 in. w. firm, dark green, naked, ovate—or deltoid-lanceolate, broadest or not at the base, rachis and costæ channelled, very slender, polished and coloured like the stipites; pinnæ apart or subdistant, few or several, alternate, spreading, the lowest one or two pair sometimes branched at the base on the inferior side, those above these simply pinnate, and gradually reduced passing into the similar, pinnate terminal part, segments apart or contiguous, articulate, on minute black pedicels, ovate-oblong, 2–3 li. l.  $1\frac{1}{2}$ –2 li. b. both ends rounded, even—or the fertile distantly crenulate-edged; veins pinnate, branches few, simple, very oblique, sori small, distant, 1–5 to a segment, in slight hollows caused by the veins not reaching the edge; involucre thinly membranous, reniform.—*Adiantum pauperculum* Kunze. *Hypolepis*, Hook. Fil. Vol. 2. t. 88. C.

Rare; St. Ann's parish, gathered near Ocho Rios by Mrs. Chisholm from whose specimens this description is taken; previously only known from Cuba. As in the preceding, the leaflets drop away in old fronds leaving the naked framework standing mixed with the younger fronds. At first sight it has the appearance of a finely divided species of *Adiantum*, to which genus it was originally ascribed.

3. *C. pedata*, A. Br.—Rootstock erect or oblique, the crown clothed with subulate brown scales; stipites tufted,  $\frac{3}{4}$ -1 $\frac{1}{4}$  ft. l., strong, erect, polished, naked, fronds deltoid-acuminate, the larger tri-partite, naked, dark green, subcoriaceous, 5-9 in. l. and as much w. quadri-pinnate, by one or two pair of the lower pinnæ being branched, the basal branch on the lower pair being deflexed and much elongated, rachis and costæ channelled, polished and coloured like the stipites; final segments pedicelate, even or crenulate-edged, 2-4 li. l., 1 $\frac{1}{2}$  li. w., acutely pointed or rounded, the base auricled on the upper side; veins pinnate, branches simple, oblique, forked in the auricle, not reaching the margin; sori along both the upper and lower margins, 2-3 or 4 to each, not reaching the base on the inferior side; involucre membranous, roundish or subreniform.—*Hypolepis*, Hook. Sp. Fil. vol. 2. t. 92. A.

Jamaica.—Rare, gathered by Purdie in one of the Western parishes, and not rediscovered by any collector in the forty years odd which have elapsed since his visit to Jamaica. The habit is peculiar and characteristic. The two basal pinnæ are more or less distinctly alternate, and generally so much developed that the fronds assume the form of three, erecto-spreading, divisions, of which the central is the least branched; but in the largest state, by the great extension of the lowest under branch of the lateral pinnæ there are five stiff nearly equal primary radiating divisions. It is probable that this and the preceding and following species are limited and local in range, as each has only appeared once in collections, though several have been made on the island.—Gathered also in Cuba by Wright.

4. *C. Reesii*, Jenm.—Rootstock fibrous, erect, clothed with minute scales; stipites tufted, wiry, slender, polished dark chestnut or blackish, channelled in the upper half, 2-6 in. l.; fronds multifid, lanceolate or ovate-lanceolate, tripinnate, naked, dull dark green, membrano-chartaceous, 4-8 in. l., 2-4 in. w., rachis and costæ channelled, coloured and polished like the stipes; pinnæ numerous, contiguous, spreading, uniform, alternate, lanceolate, the lower rather larger or not, 1 $\frac{1}{2}$ -3 in. l.,  $\frac{1}{3}$ -1 in. w., nearly sessile, tapering, terminating in a subentine serrulate bluntish point; pinnulæ merely lobed at the base, or  $\frac{1}{2}$ - $\frac{3}{4}$  in. l., 2-3 li. w., and fully pinnate at the base, with 2-6 somewhat spathulate segments on each side, 1 $\frac{1}{2}$  li. l.,  $\frac{1}{2}$ -1 li. w., the terminal larger and lobate at the base, all crenulate on the outer margin; veins pinnate, branches oblique, not entering the margin; sori contiguous, 1-4 to the side of a segment; involucre delicate, subreniform, eventually concealed by the bright brown sori.

Jamaica.—Rare; gathered at Oxford, St. Elizabeth, by the Rev. T. L. Rees. This has somewhat similar final segments to *pedata*, but with the habit, though more compact, of *microphylla*, from which the character of the sori and involucre, and other characters, readily distinguish it. It is broader and shorter than that species, with more numerous and closer divisions, and otherwise quite distinct, being in fact a true *Adiantopsis*, the species of which are distinguished by simple veinlets not entering the margin, channelled, scariose-edged rachises and costæ, distinct roundish or reniform involucre and sori, and articulated segments which are eventually deciduous. From the two allied species preceding, it may be distinguished by the pinnation being uniform in character from the base to the top of the fronds. Occasionally a frond is forked at the top.—Endemic.

5. *C. micromera*, Link.—Stipites tufted, terete, 4-8 in. l., dark coloured, naked or rusty-ciliate, the base tomentose; fronds oblong lanceolate, stiffly erect, subcoriaceous, dark green, 4-8 in. l. 1 $\frac{1}{2}$ -2 in.

w., not or hardly narrowed at the base, bi-tripinnate, rachis and costæ like stipites; naked or viscose and dark tomentose, other surfaces glabrous; pinnae generally approximate, spreading stiffly  $\frac{3}{4}$ -1 in. l. 2-4 li. w., sessile terminating in an entire acute lobe; pinnulae close oblong or ovate-oblong, blunt-acute, entire or auricled at the base or lobed or fully pinnate,  $1\frac{1}{2}$ - $2\frac{1}{2}$  li. l.  $\frac{3}{4}$ -1 li. w the lobes very minute: veins pinnate, obscure; sori copious, confluent quite surrounding the segments; involucre firm rather broadly inflexed, continuous. Plum. Fil. t. 58. *C. microphylla*, Swartz var *aspidoides*, Fée.

Jamaica.—Plentiful on exposed rocks and stoney banks at 5,000 ft. alt. in the same locality with *C. tomentosa* near the Government Cinchona Plantation. Distinguished from *microphylla* by its narrower, more compact and stiffer habit, broader firmer and more continuous involucre and absence of fragrance. There are two forms, in one of which the pinnae are fully pinnate to the point, and in the other the outer part is only pinnatifid, the former having naked rachises, those of the latter being viscid and tomentose. The substance is opaque when dry.—San Domingo.

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6. *C. microphylla*, Swartz.—Rootstock shortly repent; stipites tufted, 6-9 in. l., terete, flexuose, wiry, blackish, naked, or slightly ciliate; fronds lanceolate,  $\frac{1}{2}$ -1 ft. l.,  $1\frac{1}{2}$ -4 in. w. tripinnate, broadest at the base, thin dull grayish-green, rachis and costæ wiry, black and polished, the former slightly flexuose, naked, or viscose ciliate; pinnae distant, spreading or erect-spreading, 1-2 in. l.,  $\frac{1}{2}$ -1 inch w.; pinnulae sub-distant or approximate, only lobed or fully pinnate, nearly sessile, those in the inferior side of the lower pinnae the larger, 2-8 li. l., 1-3 li. w., the terminal segment largest, subovate, acute-bluntish, the lateral 1-2 li. l.,  $1\frac{1}{2}$ -1 li. w., ovate or oblong; veins pinnate, oblique, forked in the outer segments; sori confluent; involucre narrow, membranous, continuous or interrupted by the lobes.—Hook. Sp. Fil. vol. 2, t. 98, A. Eat. Fer. N. Am. pl. 57, Sloane t. 13, f. 2.

Cuba to the French Islands.—Generally distributed on open banks and rocks from sea level up to 5,000 feet altitude; variable in width but uniformly of lax habit. Some forms are narrow and linear-lanceolate, while others are ovate-lanceolate, broadening gradually to the base. Some fronds are much more "leafy" than others, but in all the pinnae are distant and lax in habit. Fresh fronds crushed in the hand emit a strong almond smell, hence its local name in Jamaica of "Almond Fern."

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7. *C. marginata*, H. B. K.—Rootstock upright or oblique, fibrous, clothed with dark subulate scales; stipites tufted, terete, stiff, wiry, dark polished, naked; fronds deltoid, or nearly so, tri-quadrupinnate, 3-7 in. l. and about the same w., coriaceous, dark green, glabrous or the underside slightly lanate, rachis and costæ channelled, polished and coloured like the stipes; pinnae spreading, the lower sub-opposite, the lowest pair, which are  $1\frac{1}{2}$ -3 in. l. 1- $2\frac{1}{2}$  in. w., being much the largest and most developed on the lower side, those above these gradually reduced passing into mere lobes at the top of the fronds; terminal segments linear-oblong, 2-3 li. l.  $\frac{3}{4}$ -1 li. w., final lateral lobes usually less than a line deep, the tips recurved when dry; veins pinnate, obscure; sori confluent, permanently covered by the flat, coriaceous, undulate, involucre, which nearly meet from the opposite sides.—*Allosorus* Presl., and Mart. et Gall. *Pellaea*, Baker.

Jamaica.—Plentiful on stony disintegrated banks, exposed or more or less shaded, near Old England, below the Government Cinchona Plantation, at 4,000 ft. alt. A widely spread tropical American species, first gathered in



Jamaica by Purdie, varying much in size and consequently in the shape of the fronds, small fronds appearing almost tripartite, while larger ones are as nearly uniformly pinnatifid. In the former the under surface is naked and dark, but in the latter it is pruinose from a very slight lanate film that covers it. The texture is so elástico-coriaceous that the lateral lobes curl in drying, claw-like.—Mexico to Peru and the Argentine Territory.

8. *C. tomentosa*, Link.—Rootstock shortly elongated, finely scaly; stipites tufted, 4–8 in. l. wiry, flexuose, silky with appressed pale tomentum; fronds oblong-lanceolate, tri-quadrifid, 4–8 in. l.  $1\frac{1}{2}$ –3 in. w., not reduced below, pale light green, soft, rachis and other surfaces more or less freely clothed with wool-coloured tomentum; pinnae spreading, or erecto-spreading nearly sessile, bluntish, generally distant, 1–2 in. l.  $\frac{1}{4}$ – $\frac{1}{2}$  in. w.; pinnulae oblong, contiguous or more apart, 2–4 li. l.  $1$ – $1\frac{1}{2}$  li. w.; final segments minute, concave, pod-like,  $\frac{1}{2}$  li. or less deep and broad, ovate or subspathulate, rounded, terminal, larger; sori confluent, at length filling the disk of the segments; involucre continuous, at first connivent.—Eat. Fer. N. Am. pl. 45. *C. Bradburii*, Hook. Sp. Fil. vol. 2. t. 109. B. *Physapteris*, Presl. *Myriopteris*, Fée.

Jamaica.—Plentiful on exposed rocks at 5,000 ft. alt. near the Government Cinchona Plantation, growing in spreading tufts on the surface and in crevices of rocks which are well exposed; first gathered in Jamaica by Lambert. The sporangia are few and rather large. It seems to be local in distribution, and is the only species of the section known in the West Indies.—Southern United States to Mexico.

#### GENUS XV.—*Pellaea*. Link.

SORI terminal on the veins, at first round and distinct, but soon becoming confluent, linear, and continuous, surrounding the margin; involucre continuous, membranous, or coriaceous, plain or undulate; fronds generally small, veins free.

This genus differs chiefly from the preceding by the less divided fronds, the confluent sori making a continuous line along the margin as in *Pteris*; the ends of the veins, which are the receptacles, being distinct, and not transversely connected as in the latter genus,

- a. Fronds palmate, deeply divided, and subtripartite.
  1. *P. geraniæfolia*, Fée.
- b. Fronds bipinnatifid, pinnulae ternate.
  2. *P. ternifolia*, Fée.
- c. Fronds bitripinnate, rachises flexuose.
  3. *P. flexuosa*, Link.

1. *P. geraniæfolia*, Fée.—Rootstock upright, fibrous, scaly; stipites tufted, channelled, slender, naked or the base slightly scaly, polished dark brown; fronds chartaceous, naked, bright green, subdeltoid, palmatifid, subtripartite, 2–4 in. each way, upper part simply pinnatifid, rachis and costae obscure above, prominent beneath but evanescent, polished blackish; 1–2 or 3 central pinnae lobed or pinnatifid, narrowed at the base and decurrent, lowest pair much the largest, with the lower side the deeper and freely developed with

subentire lobed or pinnatifid basal pinnulae that vary from  $\frac{1}{2}$ - $1\frac{1}{3}$  in. l., and 2-6 li. w. : final segments connected at the base, acutely pointed, 2-3 li. l.,  $1\frac{1}{2}$ -2 li. w. ; veins free, forked, evident in fresh fronds, rather obscure in dry ; sori at first distinct, at length confluent, forming a continuous marginal line, which barely falls short of the very tips of the segments ; involucre continuous, narrow, membranous, undulate, turned back and concealed eventually by the matured sori.—*Pteris geraniæfolia*, Radd. Hook. Icon. Pi. t. 915. *Pteris concolor*, Langs & Fisch. Ic. Fil. t. 21. *Pellaea concolor*, Christ.

Jamaica.—Infrequent or rare ; gathered by Sloane in 1688 “between the town of Savanna and Two-mile Wood,” and re-discovered in 1877 at the old mines, between Hope and Gordon Town, St. Andrew ; gathered a few years ago in Grenada. A widely spread species over the tropical and sub-tropical regions of the world, and long referred to *Pteris* owing to the confluence of the sori and obscurity of venation in dried specimens. It has a general resemblance to *Pteris pedata*, but is distinguished by the more copiously lobed parts, free veins, and, at first, punctiform sori. The barren fronds are small with rounded lobes, and short slender stipites.—Tropical and sub-tropical countries of the world generally.

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2. *P. ternifolia*, Fée.—Rootstock short, scaly ; stipites tufted, densely fibrillose at the base ; few to several in. l., dark brown or blackish, polished with similar rachises ; fronds 1-2 spans l. with several opposite pairs of sessile trifoliate pinnae, the pinnules of which are spreading, strict, dark green, naked linear and mucronate, the lateral ones sessile and the terminal sub-stipitate ; margins revolute ; involucre continuous, narrow, membranous.—*Allosorus*, Kze., *Pteris*, Cav. Hk. and Gren. Fil. t. 126. *Platyloma*, Brack.

San Domingo, Eggers n. 2243.—A very characteristic species with relatively narrow fronds, the pinnae when dry and contracted being suggestively claw-like. I give this and the preceding as representing the sub-genus *Allosorus* in the West Indies, and possible subjects, perhaps, of discovery in Jamaica or Trinidad, the two British islands in which one or other may exist.—Texas to Peru and Chili and the Sandwich Islands.

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3. *P. flexuosa*, Link.—Rootstock free-creeping, lignens, the growing part clothed with fine dark brown or blackish frimbriate fulvous-edged scales ; stipites stiffly erect, or span to a ft. l., terete, light brown or stramineous, naked except at the very base which is dotted with narrow attenuated scales like those of the rootstock, but which pass abruptly into a short band of smaller fawn-coloured paleæ ; fronds stiffly erect, as long or longer than the stipes, 2-4 in. w., bi-tripinnate, oblong-lanceolate, widest at the base, coriaceous, all parts very lax, rachis and costæ like stipes but more or less zigzag ; pinnae horizontal or deflexed the costæ clubbed at the base ; pinnules articulate and deciduous, on pedicels 1-3 li. l. divaricate, point lobed, cordate, 3-8 li. l. 1-3 li. w. ; margins revolute ; veins concealed ; sori confluent ; involucre firm, continuous.—*Allosorus*, Presl., *Platyloma*, J. Sm. *Pteris*, Klf. Hk. Icon. Pl. 2. t. 119.

Hayti.—The habit is subscandent in the larger plants, the growth being among bush on which the fronds, though stiffly erect, are supported. All the parts are very open and divaricating, the fronds, as the pinnules fall away by their articulation, presenting a peculiar twiggy appearance. In dried specimens the substance is opaque, and the venation entirely hidden. The colour is light throughout, the underside of the pinnulae being whitish.—Mexico to Peru.

GENUS XVI.—*Plagiogyria*. Kunze.

SORI terminal on the forked horseshoe-shaped thickened ends of the veins, laterally confluent, forming a linear, continuous marginal band; involucre continuous, involute and connivent over the sori and costæ, ultimately open; sterile and fertile fronds distinct, pinnæ of the latter contracted; veins free; stipites dilated, fleshy and triquetrous at the base, possessing spongy glands.

In the fertile fronds the veins are forked from the base, the branches diverging, and at their apices they are again shortly forked with a pair of soriferous venules, which together are horseshoe-shaped. The sori are at first roundish, but from their contiguity are early confluent, and form a continuous line, which at maturity fills the space between the margin and costæ. Occasionally a vein-branch occurs not again branched at the soriferous summit mixed with those that are, and in some instances the fertile venules seem to form a nearly complete circle by convergence. These particulars show that the genus is well founded, and, in spite of habit and apparent superficial affinity, belongs undoubtedly to this tribe, to which Moore ascribed it in his *Index Filicum*, rather than to the next to which it is generally referred and merged in *Lomaria*. The sporangia are said to have the ring oblique, but in our specimens it is decidedly vertical, splitting transversely. There is but one American species, the rest, five or six in number, being Eastern.

1. *P. biserrata*, Mett.—Rootstock upright, short, immersed; stipites cæspitose, dilated and triquetrous near the base, but narrowed again at the axis, 3-9 in. l.; barren fronds papyraceous, dark clear green, naked,  $1\frac{1}{4}$ - $1\frac{3}{4}$  ft. l. 4-6 in. w., lanceolate, fully pinnate at the rather reduced base, pinnatifid to the narrow wing of the rachis above, the apex acuminate and lobate-serrate; pinnæ very numerous, contiguous or rather apart, horizontal,  $2\frac{1}{2}$ -3 in. l.  $\frac{1}{3}$  in. w. with a rounded open sinus between, dentate-serrate, the teeth deeper, sharper and bidentate at the finely acuminate point; veins oblique, forked from the middle or base, or some simple, pellucid; fertile fronds on longer stipites, the pinnæ linear, the lower free at the base, those above adnate but notched on the inferior side, 2- $2\frac{1}{2}$  in. l.  $1\frac{1}{2}$  li. w.; sporangia densely aggregated on the receptacles, freely stipitate, globose, the band vertical.—*Lomaridium*, Presl., *Lomaria semicordata*, Baker.

Jamaica.—Frequent at about 7,000 ft. alt. on the forest-clad slopes of the higher peaks of the Blue Mountain range. The fronds rather resemble some of the conditions of *Acrostichum sorbifolium* and *Pteris longifolia*. Discovered in 1874 in Jamaica and not known elsewhere in the West Indies but widely spread on the continent from Mexico to Peru.

GENUS XVII.—*Lonchitis*. Linn.

SORI confined to the sinuses and hollows of the lobes, or more or less continuous around the margin; receptacles linear, transverse with the apices of the veins; involucre membranous; veins areolated, the terminals free.

This genus differs only from *Pteris* (*Litobrochia*), in which Mettenius included it, by the sori originating in and being continuous

around the sinuses and hollows of the lobes, instead of being interrupted there, as in that genus. But while affecting those situations most, it often forms a sinous band around the lobes, more or less continuous from the base to near the apex of the pinnæ.

*L. aurita*, Linn.—Rootstock very stout, upright, reaching 2 ft. high; the crown densely hairy; stipites several, cæspitose, erect,  $\frac{1}{4}$ – $\frac{1}{2}$  in. thick, cylindrical, 2–4 ft. l., dark warted and most densely clothed with silky aureo-fulvous glistening hair, that a first conceals the surface; fronds upright-spreading, 3–5 ft. l. and half as wide at the base, bipinnate, chartaceous pellucid: rachis and costæ clothed like the stipes; pinnæ spreading horizontally, sub-opposite or alternate, sessile, 1–1 $\frac{1}{2}$  ft. l.  $\frac{1}{4}$ – $\frac{3}{4}$  ft. w., the lobed outer part passing into the entire even-edged acute point; pinnules 3–6 in. l.  $\frac{3}{4}$ –1 $\frac{1}{2}$  in. w., opposite, horizontal, usually free and sessile in the lower half or third of the pinnæ, above this surcurrent and broadly adnate, with an open contracted sinus between the inferior ones, broadly and roundly lobed, shallowing outwards to the entire point, even margined, both surfaces freely hairy; venation reticulated, with extending costal loops, angular meshes and free marginal branches; sori reniform or linear, confined to the sinuses of the lobes, or, extending, usually interruptedly, up the sides; involucre narrow, membranous, turning dark brown.—Plum. Fil. t. 17.

Jamaica.—Rare; gathered in 1880 by Nock on the flat above Morce's Gap, below John Crow Peak, in the forest, between 4,000–5,000 ft. alt., and in 1898 on two separate occasions in separate places on a flat below the ridge from Newhaven Gap to Colthirst run, St. Georges, 3,500–4,000 ft. alt. by Harris. Nock only gathered a fragment, but Harris on each occasion abundant and complete material, and full information as to size, habit, nature of soil, &c. One frond measured by a foot-rule was 12 $\frac{1}{2}$  ft. l. from apex to base of stipe, and 3 ft. w. The rootstock is stout and erect and nearly 2 ft. high in old plants; the soil moist vegetable mould, peat and sphagnum moss, under shade, the plants all growing together. Plumier gathered his plant in Martinique, and it is remarkable that 200 years should have elapsed before its rediscovery in the West Indies. Whether regarded as conspecific with *L. pubescens*, Wild, of Mauritius and West tropical Africa or not, the Linnean name has priority. The different character of the vestiture, position of the sori in origin, and reticulated venation distinguish it at sight from *Pteris laciniata* the only other species having resemblance to it. *L. Lindeniana*, Hk. Sp. Fil. t. 89. f. A. from Caraccas and Brasil may be identical with the West Indian plant.

#### GENUS XVIII.—*Onychium*, Kauf.

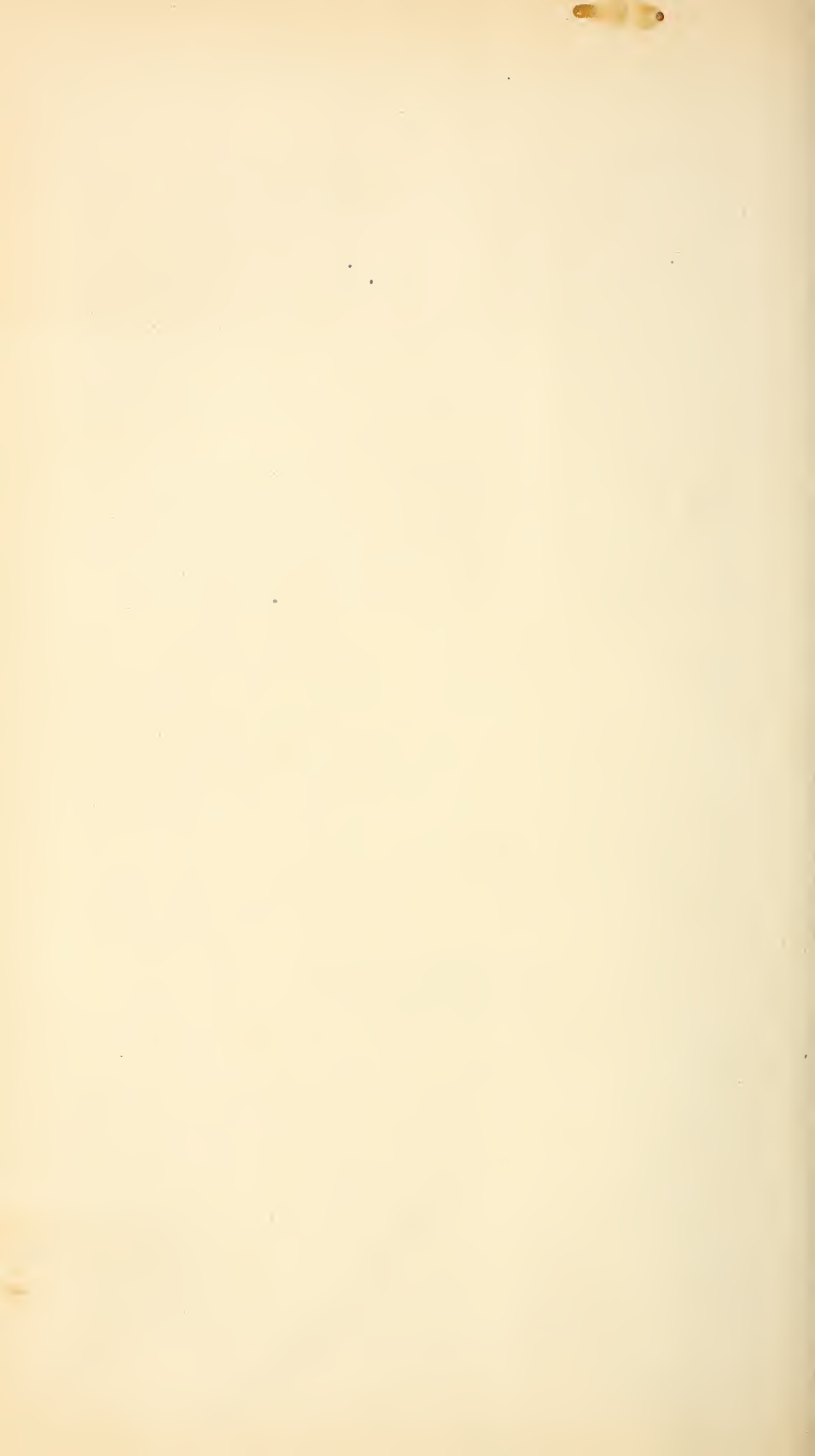
SORI oblong or linear, single, opposite or sub-opposite, on the margins of linear or ovate leaf segments, the apiculate ends of which are barren; receptacles special, linear, situated in the axils of the involucre and leaf-segments; involucre special, pale and thinly membranous; attached to the leaf margins, free along the inner edge, the opposite ones in some fronds at first connivent, eventually open, revealing the sporangia; veins free; fronds small, decompose.

This genus closely resembles *Pteris* with which it agrees in the marginal sori arranged on linear receptacles in the axils of the involucre and leaf margins. All the species are relatively small, varying from a few inches to a foot-and-a-half high, and are finely cut. They are four or five in number; one only is American. The others range respectively through Arabia, Persia and Abyssinia, India, the Malayan Peninsula and Islands, Northern India, China and Japan.

1. *O. strictum*, Kunze.—Rootstock upright or oblique, the crown clothed with small scales; stipites erect, tufted, slender, straw-coloured, channelled, naked or with a few small scales at the base, 1-2 spans l.; fronds quadripinnate, membrano-herbaceous, pale green, naked, 4-8 in. l. and about two-thirds as wide, ovate or deltoid-ovate; rachis and costæ slender, naked, stramineous, channelled; final divisions of the barren fronds,  $\frac{1}{3}$ - $1\frac{1}{2}$  li. w., toothed and sharply pointed; fertile segments ovate, apiculate, rather broader than the barren; veins fine, single in each of the final segments, or teeth; sori copious,  $\frac{1}{2}$ -1 li. opposite or sub-opposite on the ultimate segments, or confined to one side only; involucre pale, thinly membranous, ovate-oblong, exceeding the sori, the opposite ones in some fronds connivent. Hook. 2nd Cent. t. 32.

This species has only been found in the West Indies, but as yet not on any of the British Islands. It is a slender pale-coloured little tufted plant, with stipites relatively long to the fronds, which vary very much, the cutting being usually very fine. The barren and fertile fronds are mostly distinct, but some are partly both. When fertile on both the opposite margins, the segments look like little pods, but often they are only fertile on one margin. When double, they are not always strictly opposite, though nearly so, and they do not extend along the whole segment, it being barren above and below them.—Cuba, Hayti, and Porto Rico.





GENUS XIX.—*Pteris*, Linn.

Sori linear and continuous, rarely oblong, inserted on or adventitious receptacle formed in the axils of the leaf main involucres, involucres special, the same shape as the sori, and by their outer edge to the leaf margin, inflexed, free on the inner where they open, a rudimentary interior valve also rarely present; veins free or anastomosing and little or much reticulated; fronds vary from entire to multifid, and embracing wide extremes in size and form.

A genus of moderate size numbering probably over 200 species, which are confined, with one or two exceptions to the tropical belt, and the warm temperate regions of the Southern Hemisphere. About two-fifths of the number are American, over a score of which are West Indian and Guianese. Some of the species are communal, of hard coriaceous texture, capable of resisting considerable heat and drought and affecting open situations. The genus is represented from the lowest to the highest altitudes. About half the number are strictly forest plants, the rest grow in exposed or half-exposed places, open to sunlight.

- Fronds palmate or pinnate-lobate.
  1. *P. Harrisonae*, Jenm.
  2. *P. palmata*, Willd.
  3. *P. pedata*, Linn.
  4. *P. lomariacea* Kunze.
- Fronds simply pinnate.
  5. *P. longifolia*, Linn.
  6. *P. grandifolia*, Linn.
- Fronds simply pinnate in the upper part, pinnæ branched in the lower.
  7. *P. cretica*, Linn.
  8. *P. serrulata*, Linn. Fil
  9. *P. denticulata*, Swartz.
- Fronds bipinnatifid in the upper part, the lower pinnæ usually branched on the under side.
  10. *P. mutilata*, Linn.
  11. *P. litobrochioides*, Klotzsch.
  12. *P. pungens*, Willd.
  13. *P. Swartziana*, Agardh.
  14. *P. longipinnula*, Wall.
  15. *P. quadriaurita*, Retz.
  16. *P. biaurita*, Linn.
- Fronds tri- or quadripinnatifid veins free.
  17. *P. lanciniata*, Willd.  
veins areolated, —*Litobrochia*, Presl.
  18. *P. inæqualis*, Jenm.
  19. *P. podophylla*, Swartz.
  20. *P. Kunzeana*, Agardh.
  21. *P. brevinervis*, Jenm.
  22. *P. bulbifera*, Jenm.
  23. *P. propinqua*, Agardh.
  24. *P. regia*, Jenm.
  25. *P. aculeata*, Swartz.
  26. *P. hondurensis*, Jenm.
  27. *P. elata*, Agardh.
  28. *P. longibrachiata*, Agardh.
  29. *P. multiserialis*, Jenm.
  30. *P. gigantea*, Willd.
  31. *P. Hartiana*, Jenm.
- Fronds tripinnate.
  32. *P. heterophylla*, Linn.
  33. *P. leptophylla*, Swartz.
  34. *P. ciliaris*, Eaton.
  35. *P. incisa*, Thumb.
- Fronds quadripinnate.
  36. *P. deflexa*, Link.
  37. *P. aquilina*, Linn.
  38. *P. viscosa*, Moore.

*Harrisonæ*, Jenm. Rootstock small fibrous, tufted, scaly; stipites dense, slender, erect, dark brown, glassy, naked, 3-5 in. l.; fronds usually 3-5 lobed,  $1\frac{1}{2}$ -2 in. w. and d., papyraceous, transparently pellucid-dotted, bright green, paler beneath, glabrous and shining, base deeply and widely cordate, lobes broadly rounded between the sinuses between; veins flabellated, forked near the base, originating within the margin in clavate apices, conspicuous by the translucency of the parenchyma, primary branches costate, dark brown like the stipites, raised beneath, the colour evanescent in the outer third; sori continuous in the asiel of the margin and involucre beyond the ends of the veins all round the even margin from the apex of the stem; involucre narrow, pale, even, unbroken.—Gard. Chron. Dec. 10th 1898, p. 10.

British Guiana; on rocks arising from the great basin at the base of the Kaieteur Fall, growing in masses, each of the aggregated plants forming a small tuft. The thin pellucid substance, free veins terminating well within the edged and sinuously lobed margin,—both lobes and hollows rounded and even-edge without incisions, mark it well from any other plant in the genus.

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2. *P. palmata* Willd.—Stipites slender, erect, tufted from a small fibrous castaneous scaly rootstock, wiry, often flexuose, dark brown or blackish, rather polished, 6-10 in. l.; fronds 3-6 in. each way or more, subentire trilobed, or palmately divided, naked, the underside paler than the upper, two lowest lateral divisions in the larger fronds largest, and these again in the most divided states deeply lobed on the underside; segments deltoid oblong or linear-oblong pointed, 2-4 or 6 li. w., 1-2 in. l, sinuses acute or widely open and obliquely round, a primary blackish rib in each division which is prominent beneath; veins areolate, often obscure in the coriaceous opapue substance; sori uninterrupted around the even or slightly crenate margin of the frond or segments and sinuses; involucre narrow, plain or slightly wavy; barren fronds smaller and more entire more slender and shorter stipites.—*P. collina*, Radd. *Doryopteris* J. Smith.

Guiana Schomburgk, Appun. a very variable species in size and degree of cutting merely lobed, pinnatifid or bipinnatifid; very near *pedata* but more coriaceous and often attaining a much larger size, though the Guiana specimens are small, only 2-4 in. each way very deeply cut, and on petioles 6-10 in. l., under *pedata* I have mentioned that I think the Jamaica specimens ascribed to this species are barren or undeveloped states of that.—Both sides of tropical America from the West Indies southward to Rio Janeiro, also in India Australia.

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3. *P. pedata*, Linn.—Rootstock small, fibrous, scaly; stipites tufted, slender, wiry polished blackish, 2-6 in. l., furfuraceous or naked at maturity; fronds subdeltoid, tripartite, 3-5 in each way, subcoriaceous, dark green above, pale beneath, naked or the ribs slightly furfuraceous; central portion larger, and equilateral, deeply pinnatifid below the entire lanceolate-acuminate apex, the lowest pair of its segments entire or pinnatifid and decurrent; lateral portions furcate from near the base, the divisions nearly equal or the superior



larger, divaricating, subentire or more or less pinnatifid on one or both sides; rachis and costæ inconspicuous on the upper side, beneath prominent but evanescent outwards, dark coloured and polished; veins forming a fine net work, without free branches, obscure in dry fronds; sori continuous along the margins.—Plum. t. 152 *Doryopteris*, J. Smith.

Jamaica; frequent under banks in open and shady situations in the mid region of the principal mountain ranges, from 3,000 to 4,500 ft. alt. The smaller-divided, fronds which are uniform, in some plants, but may often be gathered with the larger, more divided, from the same rootstock, are often in herbaria ascribed to *P. palmata*, Linn., a species similar but more coriaceous, and somewhat less divided in the fronds, found in the mainland. See also the note to *Pellaea geraniifolia*.—General through the West Indies from Cuba to the French Islands, and on the mainland from Venezuela.

4. *P. lomariacea*.—Kunze. Rootstock tufted, fibrous, shortly repent, erect-oblique, clothed with fine castaneous scales, stipites tufted, erect, 1-2 ft. l., dark castaneous, polished, finely scaly at the very base; fronds dimorphous coriaceous, naked, paler on the under-side, the sterile with broader parts, subpalmate and pinnatifid, lower pair of pinnæ much the largest and forked or again pinnatifid, on the lower or both sides, two or three on each side above these usually simple and linear-ligulate  $1\frac{1}{2}$   $2\frac{1}{2}$  in. l.  $\frac{1}{4}$ - $\frac{1}{3}$  in. b., with a similar blunt terminal segment; rachis winged to the width of the pinnæ, a distinct costæ in each segment, prominent beneath at the base; veins fine, close forked, the branches occasionally anastomosing; fertile fronds similar in shape but the pinnæ much narrower and linear, and the rachis and costæ stronger; sori continuous around all the margins; involucre coriaceous, distinct.—*Doryopteris* Klotzsch

Guiana; in the Roraima range of mountains. Generally there are three pinnæ on each side an inch or more apart in the fertile fronds, and half that in barren, and a terminal one, the lowest pair forked or when fertile distantly pinnatifid on one or both sides, all the parts including the winged rachis being the same width, and fewer narrower and more distant than in *pedata*. In the largest fronds the fertile pinnæ are four to a side the lowest lobed on both sides, and the next pair above these on one or both sides. The stipes of the fertile fronds are twice longer and stronger than the barren.—Peru and Brasil.

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5. *P. longifolia*, Linn.—Stipites tufted, spreading, from a few inches to 1 or 2 ft. l. nearly naked or more or less freely villose-scaly, and asperous arising from a stout, shortly repent rootstock which is densely dotted with fine aureous scales; fronds 1-3 ft. l.  $\frac{1}{2}$ - $1\frac{1}{4}$  ft. w. simply pinnate, stiff, dark green, striated, the base generally much reduced, the apex terminating abruptly in a linear segment; rachis channelled, and with costæ glabrous or villose; pinnæ very numerous, spreading horizontally, linear, 4-8 in. l. 2-6 li. w. cordate or more or less auricled at the sessile base, acuminate or blunt-pointed, the barren margins crenate-serrate; veins close, spreading, once or twice forked; sori narrow, continuous along both margins, fulvous; involucre as wide, membranous, pale brown.—Sloane, t. 34.; Plum. 69 and 70; Eat. Fer. N. Am. pl. 78. *P. vittata*, Linn.

West Indies generally from the Bahamas; common on banks and in dry woods up to 4,000ft. alt. Very variable in size of fronds, width of pinnæ and

vestiture. In the narrower forms the inflexed involucre nearly touch the midrib, while in the broader there is a more or less open space between; the pinnae of barren fronds in all being broader than those of the fertile. At the higher elevation it is more hispid or villose than in the low. The summits of the veins in barren fronds are thickened, and often covered with minute calcareous scales. There is a remarkable multifid freely lobed and incised state, and another with the apex fasciated, spreading fringe-like. The Linnean names are founded on the larger and smaller states. Plumier's t. 70 is *P. stipularis* L. (*P. sagittata*, Hk.) Eighteen synonyms are enumerated in Sp. Fil. Vol. 2. p. 157—Southern United States Mexico, Venezuela, and from Southern Europe, and the warm temperate regions round the world to South Australia.

6. *P. grandifolia*, Linn.—Rootstock stout, free-creeping, densely coated with brownish scales; stipites apart stramineous,  $\frac{1}{4}$ - $\frac{1}{2}$  in. thick, strong erect, scaly at the base, 2-4 ft. l. not channelled; fronds stiff, 3-6 ft. l.  $1\frac{1}{2}$ - $2\frac{1}{2}$  ft. w., simply pinnate, sub-coriaceous, naked, the rachis strong, channelled, straw-coloured or brown; pinnae entire, numerous, about 2 in. apart,  $\frac{3}{4}$ - $1\frac{1}{4}$  ft. l. 1- $1\frac{1}{2}$  in. br. sessile and sub-rounded or rather cuneate at the base, the lower ones shorter on the inferior side, terminal like the lateral; veins very close, spreading at a wide angle from the midrib, simple or forked and parallel within the marginal network; sori in a marginal band, extending from the base to the finely serrated tapering point.—Plum. t. 105 Hook. Sp. Fil. Vol. 2 t. 113 B. *Heterophlebium*. Fee

Jamaica, Grenada, Trinidad; common among the lower hills on roadsides, banks, and stony, more or less exposed, places. This resembles, in the form of the fronds, *Davallia Saccoloma*; but is more robust and coriaceous. As the young fronds unroll, they are coated with a sparse woolly clothing, which disappear as they develop. The surface is rather silky looking on the upper side, which is darker than the under. Both in this and *longifolia*, the sporangia are early mixed with scales. A narrow form, *P. vittata*, Schk, has mostly free veins.—

Cuba, St. Domingo, Porto Rico, Guadeloupe, and from Mexico to Peru.—*P. dominicensis* Baker, described in Hook Icon. t. 1642, collected by Baron Eggers, in Dominica is the fertile state of *Acrostichum præstantissimum* Bory. (*Lomagramme*, J. Sm. *Neurocallis*, Feé) mentioned by both Hooker and Grisebach in their descriptions of that species.—

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7. *P. cretica*, Linn.—Stipites 1-2 ft. l. numerous, slender, erect, naked, stramineous, channelled, arising from a shortly creeping fasciated rootstock; fronds  $\frac{1}{2}$ -ft. l., nearly as w., light green, naked, chartaceous, composed of a long terminal pinna and 2-3 pairs of distant similar, linear-ligulate, and acuminate erecto-spreading lateral ones, the upper pair of which are close to the base of the terminal and shortly decurrent on the slender, channelled, straw coloured rachis, the middle pair sessile, subcuneate at the base but not decurrent, the lowest pair forked from near the base, the membrane on the lower side below the fork being absent, 4-9 in. l. about  $\frac{1}{2}$  in. w. those of the barren fronds rather wider, and spinulose-serrate; veins close,

spreading nearly at right angles, simple and forked; sori continuous in a marginal band, falling short of the sharply serrated apex.—*Eat. Fer. N. Am.* pl. 64,

Jamaica; infrequent on the banks of streams between 4,000-5,000 ft. alt. gathered below Belle Vue, Government Cinchona Plantation. The discovery in Jamaica, in the region mentioned, made the West Indies a new habitat for this widely distributed species. It is remarkable for its fine, long, narrow, very tapering pinnae, and slender straw-coloured vascular parts.—Widely open in the Old World and reaching the Southern hemisphere, and from Florida to Brasil.

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8. *P. serrulata*, Linn. fil.—Rootstock shortly sub-repent faciculated, strong and ligneous, the nascent growth densely clothed with fine very dark brown scales; stipites tufted, erect, slender, channelled, 3-6 in. l., stramineous, naked or with a few fine scales at the base; fronds from 1-2½ spans l. l. 1½ span w., composed of a simple linear terminal pinna 3-9 in. l. 2-4 li. w. and few or several opposite distant spreading similar lateral ones, the superior of which are almost or quite connected by an interrupted decurrent, broad marginal wing to the rachis, their own width, the inferior 1-2 pairs being free and stipitate with 1-2 spreading similar branches at the base, all parts pale green, thin pellucid, naked, the vascular parts straw coloured; veins free, simple and forked mixed, close, spreading at a wide angle; sori continuous from the base but terminating at the serrated outer part: involucre narrow, silvery; barren fronds smaller, but broader in their parts and serrate.

This is a near ally of *P. erectica*, Linn. which was discovered in Jamaica a quarter of a century ago, though known before from the mainland, and like that species long well known in the Old World (China and Japan). It differs by its narrow parts, and through few more pinnae, broadly winged rachis, and the basal pair (or more) of pinnae having a simple branch on each side instead of being simply forked from the base. Mr. Baker in mentioning its discovery in Alabama and Guadeloupe asks—"Can it be a form of *Cretica*?"—China, Japan, Natal.

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9. *P. denticulata*, Swartz.—Rootstock erect or oblique and decumbent, clothed with minute dark scales; stipites freely tufted, curved at the base, erect, 1-1½ ft. l. brown or stramineous, channelled, rather slender; rachis slender, channelled, winged in the upper part; fronds erect, 1-1½ ft. l. ½-1 feet w. pinnatifid in the upper part, pinnate or bipinnatifid in the lower, with a terminal segment like the lateral, thin and papyraceous, pellucid, the surfaces naked, a clear light green; pinnae spreading or erects spreading lanceolate or linear lanceolate, acuminate base curvate, the upper ones simple and adnate-decurrent, those below these free and forked near the base below, or pinnatifid or fully pinnate chiefly on the inferior side and usually petiolate, 4-6 in. l. ½-1 in. w., the barren spinulose dentate along the margin as are also the fertile beyond the sori; veins evident, copiously reticulated, forming rather large angular oblong meshes running obliquely toward the margin, sori continuous on both margins; involucre narrow pale, membranous.—*Hook and Grev. Icon. Fil. t. 28 P. papyracea*, Hook, *Litobrochia*, Fèe.

Guiana; Schomburgk; Appun on the Cumaka Mountains. This is variable and lies between in habit and texture *P. cretica* and *P. ciliaris*. In its larger states it is more compound. This large state is *P. brasiliensis* Radd. The

branching of the one to four or five pairs of the lower pinnæ is on the inferior sides, the pinnules being the same shape, adnate-decurrent or the basal ones free and stipitate or petiolate. Cuba, St. Domingo, to Brasil.

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10. *P. mutilata*, Linn.—Rootstock small, fibrous, clothed with dark blackish scales; stipites tufted, very slender, channelled, 2-8 in. l. naked; fronds thin, light green, pellucid naked, 3 in. to a span l. half or two-thirds as w. at the base, the upper part simply pinnate, with a linear-oblong terminal segment, and few or several similar shorter, or as long, spreading lateral ones, the basal one or more pair again similarly pinnate, the ends rounded and the points apiculate,  $\frac{1}{2}$ - $\frac{3}{4}$  in. l.  $\frac{1}{4}$  in. w. the margins even or crenulate, and cartilaginous edged; rachis slender, pale, narrowly winged in the upper part; veins open, dichotomously forked; sori marginal, falling a little short of both apex and base; barren fronds with shorter stipites and broader segments.—Hook. sp. Fil. vol. 2 t. 131 A.

Var. *P. concinna*, Hew.—Stipites 1-1 $\frac{1}{2}$  ft. l.; fronds  $\frac{3}{4}$ -1 ft. l. 5-8 in. w. bi-tripinnate, formed of a terminal pinna and 2-4 similar, but usually narrower and shorter, lateral ones 2-6 in. l. and 1-1 $\frac{1}{2}$  in. w. the lowest pair of which are branched at the base and petiolate, all slightly echinate on the costæ above; final segments  $\frac{3}{4}$ -1 $\frac{1}{4}$  in. l. 2-3 li. w. decurrent, a notch on the superior side, the point blunt, often slightly apiculate, the sinuses more or less obliquely open; veins forked, the lowest pair springing from the costæ.—Plum. Fil t. 51.

Jamaica plentiful on calcareous rocks and banks at 2,000-4,000 ft. alt. in dry woods. Port Royal Mountains, St. Andrew. It possibly attains a larger size than I have described. The variety *concinna*, first described by Heward in 1838, (Mag. Nat. His., new series, p. 435), is common about Christiana, Manchester. It looks very different at first sight, and shows a tendency towards *Swartziana*, the pinnæ being similarly notched and decurrent at the base, with the lowest vein springing from the costæ, but the smaller fronds gradually pass into the type.—Cuba, Haiti, Porto Rico.

11. *P. litobrochioides*, Klotzsch.—Stipites stiffly erect, 2-3 ft. l., rather slender upwards, asperous or with a few scattered small prickles, castaneous, naked to the base where there is a small tuft of subulate castaneous scales; fronds bipinnatifid, 1 $\frac{1}{2}$ -2 ft. l. 1-1 $\frac{1}{2}$  ft. w. dark green, naked, chartaceous; pinnæ in few or several, opposite-crecto-spreading pairs, the inferior distant 2-3 in. and a similar large terminal one, 7-10 in. l. 2-3 in. w., shortly reduced at the base, deeply pinnatifid; segment linear the acute outer third of each serrated or bluntish, close with a narrow sharp or open rounded sinus between, 1-1 $\frac{1}{2}$  in l.  $\frac{1}{4}$  in. w., cartilagenous edged, the inferior reduced and deltoid-rounded, the terminal attenuated and deeply toothed in the outer part; rachis slender, brown, channelled; costæ dark brown channelled and spinulose at the base of the ribs on the face, rounded and prominent beneath; veins raised on the underside close, oblique once forked; sori continuous from the sinus nearly to the point, involucre narrow, membranous. pl. Fil. t. 13.

Trinidad and Guiana; resembles very closely *P. pungens*, Willd. but is distinguished by the basal, pinnæ not being forked. The lowest vein of each segment on the interior side springs from the costæ as in *pungens* and *Swartziana*,

and runs to the sinus. The habit is slender, the pinnae relatively large to the other parts and abruptly reduced at both ends, the surface with a veiny look.—San Domingo, Brasil.

12. *P. pungens*, Willd.—Rootstock decumbent or erect, woody, clothed with fine subulate, castaneous scales; stipites 1-1½ ft. l., tufted, erect, quadrate, channelled, prickly, castaneous or stramineous, naked but with a small tuft of fine scales at the base; fronds erect, bi-tripinnatifid  $\frac{3}{4}$ -1½ ft. l.,  $\frac{3}{4}$ -1¼ ft. w., glabrous, papyraceous, dark glassy green; composed of 1-4 lateral erecto spreading stipitate pinnae and a terminal similar one, all 2-4 in. apart, the lower pair petiolate and once forked at the base; cut down to within a line of the costae into close, spreading, mostly blunt or round ended dentate segments  $\frac{1}{4}$  in w. 1-1¼ in l., with narrow acute sinuses between, basal reduced and deltoid decurrent, terminal caudate, narrower, tapering, often attenuated conspicuously toothed; rachis and costae channelled, slender, straw or chesnut coloured, not armed,; veins conspicuous, pale, close, oblique, once forked near the base, the interior basal pair, one of which is usually forked running from the costae into the sinus; involucres narrow extending from the sinuses uninterrupted but not reaching the apex, the edge cartilagenous.—Pl. Fil. t. 14.

Porto Rico, Trinidad, Guiana; frequent in damp forests. This and *litobrochoides* as mentioned closely resemble each other differing only by the forked basal pinnae of this. In both these and *Swartziana* the vascular parts are either chesnut or straw coloured, and the surfaces in each are marked by the conspicuous venation. The terminal segments in Trinidad specimens are long attenuated and deeply serrated. It is probably also Venezuelan, extending through British and Dutch Guiana to northern Brasil.

13. *P. Swartziana*, Agardh.—Stipites caespitose, 1½-2 ft. l., glossy light or dark brown, channelled, slightly scaly at the base, arising erect from an oblique or upright rootstock; fronds bi-tripinnate, 1-2 ft. l.  $\frac{3}{4}$  1 ft. w., thinly chartaceous, naked, light or dark green, composed of a long terminal pinna and a few or several similar opposite erecto-spreading sub-distant lateral ones 5-10 in. l. 1-1¾ in. w., sessile, or the lowest pair which are once forked at the base, very shortly petiolate, terminating in a narrow linear acuminate sharply serrated segment,  $\frac{1}{2}$ -1½ in. l., the slender costae echinate on the upper side; final segments oblique, linear-oblong, bluntish, broadened and rather decurrent at the base, the narrow cuneate sinus obliquely cut through the centre; veins simple, or forked from the middle. the lowest pair from the base, and springing from the costae in the shortly decurrent membrane; sori of contiguous segments separated by the incision of the sinus, and falling more or less short of the serrated apex.—Hook and Grev. Icon. Fil. t. 142. *P. bivaurita*, Swartz.

Jamaica; in frequent in damp mountain forests at 2,000-3,000 feet alt. in the eastern parishes. A strictly forest plant, not very common, distinguished from the two preceding by its very slender parts throughout. More numerous narrower pinnae and segments, stipes twice as long curved at the base, and incised sinuses.

14. *P. longipinnula*, Wall.—Rootstock erect, the nascent fronds bud-like and coated with small appressed gray scales; stipites erect, channelled, naked or with few of the bud-scales at the base, straw-coloured, 2-3 ft. l.; fronds bi-tripinnate, 2-4 ft. l., 1½-3 ft. w., pale

green, naked chartaceous, with a terminal pinna and 6-12 opposite or sub-opposite distant spreading lateral ones,  $\frac{3}{4}$ - $1\frac{1}{2}$  ft. l., 2-3 in. wi. spinulose on the costæ above, the lower petiolate, the lowest pair ones forked at the base, terminating in a caudate segment, and cut down almost to the costæ into linear-oblong entire segments, rounded at the point, straight or slightly falcate,  $1-1\frac{1}{2}$  in. l.  $\frac{1}{4}$  in br., cartilaginous edged, the sinuses sharp or rounded; veins close, spreading, forked; sori falling short of both apex and base.—Hook. Sp. Fil. vol. 2 t. 134.

Jamaica; common in the moist forest on the banks of St. George's Spring, Chesterfield, St. Mary. In the form and other characters of the fronds it is absolutely indetical with the Indian and Malayan plant of the name but whether that possesses the same rootstock in which each frond starts as an independent scale-covered bud, developing its own roots, as in the analagous case of *P. bulbifera* I am not aware. If not, this is a distinct species.

15. *P. quadriaurita*, Rtz.—Stipes cæpitose,  $1-2\frac{1}{2}$  ft. l., slightly scaly and occasionally rather asperous at the base, channelled, pale or dark glassy brown, arising erect from an upright rootstock; fronds  $1\frac{1}{4}$ -2 ft. l.  $\frac{3}{4}$ - $\frac{1}{4}$  ft. w. bi-tripinnate, chartaceous, light or dark green, rachis and costæ coloured like the stipes, with a terminal pinna and several similar pairs of spreading or erecto-spreading lateral ones, which are 6-8 in. l.,  $1\frac{1}{2}$ -2 in. w., rather widest at the usually sessile base; final segments linear-oblong, straight or subfalcate, obtuse,  $\frac{3}{4}$ -1 in. l. 2-3 li. br. and a longer strait terminal one, the sinuses acute or rounded; veins close, forked, all springing from the rib; sori falling short usually of the apices, which are not serrated.—Hook. Sp. Fil. vol. 2. t. 134. B.

var. *P. felosma*, J. Sm.—Fronds as large and parts as broad, but but stipites, rachis, &c., more slender, texture thinner, segments close, with no open space between, costæ with larger echinæ on the upper side.—*P. asperula* J. Sm.

var. *P. nemoralis*, Hook.—Fronds much smaller, pinnae more numerous, 3-5 in. l.  $\frac{1}{4}$ - $\frac{3}{8}$  in. w., branches to the lowest pair 1-2.

var. *affluens*, Jenm.—Fronds 2-3 ft. l. 1-2 ft. w., on stipites 2-4 ft. l.; pinnae throughout fully pinnatifid, the lowest 2-3 pairs with 2-3 branches similar to the lateral pinnae on their under sides.

Cuba, Jamaica, Trinidad; common in one form or another throughout the country, from sea level up to 6,000 ft. alt. inhabiting chiefly open or half shaded situations and waysides. The colour of the stems, &c., varies from a light straw to dark chestnut. The first variety is a weaker, but not smaller plant, with closer segments, and emits while fresh a stong feline smell. The last is found at the higher ranges, has numerous pinnae, marked by the 2-3 lower ones on each side having 2-3 deflexed branches each. The second, a mountain form too, is only marked by its smaller size, numerous pinnae, firm texture and complete habit.—Tropics of both the Old and New worlds.

16. *P. baurita*, Linn.—Rootstock upright; stipites cæspitose, erect,  $1\frac{1}{2}$ - $2\frac{1}{2}$  ft. l. naked or slightly scaly, channelled, dark-brown, or light green; fronds erect, bi-tripinnate,  $1\frac{1}{4}$ - $2\frac{1}{2}$  ft. l.  $\frac{3}{4}$ - $1\frac{1}{4}$  ft. w. naked, chartaceous, light green; pinnae in 6-15, opposite, sessile, erecto-spreading pairs, with a similar terminal one, the lowest pair once forked on the lower base, 6-9 in. l.  $1\frac{1}{2}$ - $2\frac{1}{2}$  in w. deeply pinnatifid throughout, terminating in a caudate point; segments linear-oblong, straight or subfalcate,  $1-1\frac{1}{4}$  in. l.  $2\frac{1}{2}$  li. w., blunt, an open rounded

snius between; veins pellucid, close, spreading at a wide angle, all forked except those springing from the narrow transverse costal arch which spans from rib to rib of the segments; sori falling little short of the apex.—*Campteria*, Presl., Plum. t. 15 (venation not shown).

var. *subpinnatifida*.—Fronds smaller, paler; pinnae irregularly lobed, or lobate-sinuate; veins occasionally united beyond the costal arc.

Jamaica, Antigua; frequent among brushwood and grass in half-open places among the lower hills. Not nearly so common but closely resembling *quadriaurita*, the pinnae less deeply pinnatifid, sinuses more open and rounded, and clearly distinguished by the curved veins which uniformly connect the bases of the ribs of the ultimate segments. Tropics of both the Old and New Worlds.

\* \* \* \* \*

17. *P. laciniata*, Willd.—Root-stock stout, fleshy and greenish, shortly repent, stipites 1-2½ ft. l, stout, fleshy, light green, densely hispid; fronds 3-5 ft. l. 1½-3 ft. w., dark green, paler beneath, membrano-herbaceous, bi-tripinnate, hirsute on the fleshy rachis and costæ; pinnae large, subovate, acuminate, usually broadest at the base, 1-1¾ ft. l. ½-1 ft. w., the lower petioled; pinnulae 3-6 in. l. 1½ or 2 in. w., deeply pinnatifid, slightly adnate at the base, apex tapering, entire; ultimate segments oblong, curved, ½-1 in. l. 2-4 li w., the sides entire or in the inferior ones lobed or pinnatifid, the ends rounded and even, veins rather open simply or widely forked; sori continuous from the sharp sinus, not reaching the top of the segment; involucre pale, silvery, ciliate.—*Louchitis hirsuta*, Linn. *Antiosurus hirsutus* Kuhn.

General throughout the West Indies; frequent in very moist woods near streams, ascending to 4,500 ft. alt. Resembling *Louchitis* exactly in appearance and texture, from which the free veins and exclusively lateral sori separate it. The substance is thin and membranous, very flaccid, densely pellucid-dotted, the framework fleshy and green, and everywhere hispid. The strigæ magnified are beautifully translucent, jointed and full of liquid. Plumier's fig. 20, appears to be intended for this, but shows the abundant sori exclusively confined to the sinuses, as in *Louchitis*. Sloane first gathered it—on the "Banks of the Rio d' Oro; St. Mary's Jamaica."—Mexico to Peru.

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SUB-GENUS *Litobrochia* Presl. In counting the series of areolæ in this sub-genus it must be observed that the exterior line is formed by the branches connecting with the thread like receptacles, which which branches are free in the barren fronds the series consequently being one less.

\*The species of this sub-genus require to be known in the growing state, in which condition the differences in rootstock, forms of frond, and other characters can be observed, to be rightly understood, as they are generally too large for more than partial representation in the dried herbarium state. The collector should in gathering specimens in the forest sketch roughly in outline the form of the fronds and rootstocks, on a diminutive scale, as in Fées figures of the fronds of *inequalis* and *brevinervis*.

18. *P. inaequalis*, Jenm.—Rootstock small upright, fibrous, clothed with minute brown subulate scales, stipites cæspitose, erect, channelled,  $1\frac{1}{2}$ -3 ft. l., rather slight, light green or brown-stramineous, naked or with a few scales from the rootstock at the base; fronds spreading, 2-3 ft. each way, tripartite, the lateral branches nearly as large as the central, each  $\frac{3}{4}$ -1 ft. w.,  $1-1\frac{1}{2}$  ft. l., the lateral divisions petiolate  $1\frac{1}{2}$ -3 in. the central 4-7 in., naked, chartaceous, bright green; rachises and costæ slender channelled, coloured like the stipites, pinnæ spreading, 6-10 in l.  $1-1\frac{1}{2}$  in. w., with a similar terminal one to each of the three divisions, distant 1-2 in., subcuneate at the base and shortly narrowed, the upper ones sessile or stipitate, the lower petiolate  $\frac{1}{2}$ -1 in., passing gradually from the middle outwards into a  $1\frac{1}{2}$  in. l., linear-lanceolate serrato-entire point rather blunt at the tip, cut  $\frac{2}{3}$  or more to the costæ into oblique oblong lobes, which are 4-8 li. l., from the acute or open sinus, 3 li., w., above the broad base, the point obtuse broadly rounded and dentate; veins forming a series of narrow costal meshes which reach from rib to rib of the segments, and in the latter a single or double series of angular meshes with short exterior venules; sori linear, reaching from the sinus nearly to the tip of the segments; involucre narrow, pale, membranous.—Litobrochia Fee. Fil. Ant. t. 8. f. 1.

Trinidad and Guiana; a slender spreading tripartite species, the three divisions in large fronds being nearly equal in size and form. As a rule they are equilateral but in some cases the lateral divisions are deeper on the inferior side. The Trinidad state is rather broader in the pinnæ and firmer in texture than that common in Guiana. In rare cases the basal one or two pairs of pinnæ of the central division are shortly branched at the base. As in several other species with similar rootstocks, the latter in time divide and sub-divide till eventually large clumps are formed of aggregated separate plants. Fèes figures cited above are based on specimens gathered in Trinidad in 1862 by Germain and are very characteristic. In British Guiana it is found both on the North-west South-east sides of the Colony.

19. *P. podophylla*, Swartz.—Rootstock, erect, 6-8 in. thick, the crown scaly; stipites 4-8 ft. l., cæspitose, stout, erect,  $1\frac{1}{2}$  in. thick, faintly channelled, the base muricate and clothed with linear acuminate dark scales; fronds pedatiform, spreading horizontally, 3-4 ft. each way, subcoriaceous, naked, dark glossy green; primary divisions three, the central not branched again from the base, and, longest 2-4 ft. l.  $\frac{3}{4}$ - $1\frac{1}{2}$  ft. w. lateral divisions usually four-times branched, the branching occurring outwardly in succession, each branch shorter than the preceeding, and all oblong in shape; pinnæ very numerous, approximate, spreading nearly at right angles, a similar terminal one 6-9 in, l.  $1\frac{1}{4}$  in. w. the inferior reduced sessile, passing gradually at the apex into a serrato-entire acuminate point; within this cut deeply into short, broadly subacute, falcate segments  $\frac{1}{2}$ - $\frac{3}{4}$  in. l.  $\frac{1}{4}$  in. w. with an acute or rounded sinus between, the costæ above spinulose; vein-meshes 1-2 seriate, with rather long free exterior branches, the transverse costal areolæ very shallow, reaching from rib to rib; sori continuous from the sinus, falling short of the finely spinulose-serrate apex.—Br. Hist. Jam. p. 89, t. 1. Hook. Gard. Ferns, t. 55.

Jamaica; common in wet situations in open and half open places from 4,000-6,000 ft. alt. The fronds spread sub-horizontally, and the gradual shortening of the exterior branches gives them a somewhat circular outline. The pinnæ are a uniform width from the base outward, and narrow than in any of the local allies.



The petioles are only muricate at the base, the upper parts being quite smooth. The distribution as in the case of most of the larger species of *Litobrochia* is uncertain as recorded. Grisebach gives of the British islands, "Jamaica! St. Vincent! Trinidad! but though the two latter have been carefully collected over of late years, the species has not appeared. He also gives "Cuba to French islands!," but in none of these has it appeared either. The mainland distribution is given as from Mexico along the Andes to Ecuador.

20. *P. Kunzeana*, Agardh.—Rootstock, woody, stout, decumbent, shortly repent the extending end densely clothed with narrow ferruginous scales; stipites tufted, strong, erect,  $1\frac{1}{2}$ -3 ft. l., green or brown, the scales of the rootstock ascending the base, smooth and faintly channelled; fronds ample, tripartite, tripinnate, deltoid, about 2 ft. l.  $2\frac{1}{2}$  ft. w., glabrous, dark glassy green above, pale beneath, subcoriaceous; central division larger, equilateral, otherwise similar to the lateral which are distant by the naked rachis and deeper on the inferior side; pinnae 6-10 to a side, with a similar terminal one,  $\frac{3}{4}$ -1 ft. l.  $1\frac{1}{2}$ -3 in. w., the acuminate spinulose-serrate apex forming a segment 1-2 in. l., within this deeply pinnatifid into broadish, spinulose-serrate subfalcate, acute, segments,  $\frac{3}{4}$ -1 $\frac{1}{2}$  in. l.  $\frac{1}{3}$ - $\frac{1}{2}$  in. w.; rachis channelled, light green, costules spinulose on the upper side at the base of the final ribs; vein meshes 1-2 or 3 serial, the exterior branches free, and a single line of long narrow costal areoles that span from rib to rib; sori short of the top of the segments; involucre silvery.—Hook. Sp. Fil. vol. 2. t. 139.

Jamaica; common in moist woods, among the lower hills in the eastern parishes, ascending to about 1,500 or 2,000 ft. alt. The pinnae of the separate divisions are 2-3 in. apart from base to base, the lower shortly petiolate, cut down to within 2-3 li. of the ribs. The rootstock, which is its chief distinguishing feature, is uniformly prostrate, stout and woody, and densely clothed with ferruginous acicular attenuated scales  $\frac{1}{2}$ -1 in. l., the stipes devoid of spines. Sloane first gathered it "on the inland parts of the island," the specimens being on p. 162 in his herbarium. Hooker's figures, quoted above, is of a plant gathered apparently without rootstock, by Seeman in Ecuador, in which the pinnae are less deeply cut, cuneate at the base, the costal arch being absent.

21 *P. brevinervis*, Jenm.—Rootstock, erect, knoblike, 1-1 $\frac{1}{2}$  in. in di., densely clothed with small linear-acuminate dark coloured scales, stipites strong, erect, channelled, dark green, with or without a few distant fine prickles, deciduously scaly at the base, 1-1 $\frac{1}{2}$  or 2 ft. l., fronds erect, tripinnatifid, 1 $\frac{1}{2}$ -2 ft. l., about the same w., at the base, dark green alike on both sides, chartaceous, glabrous, glossy; pinnae opposite, spreading 3-5 to a side, passing into a large pinnatifid portion a span or less l. and w. terminating in an entire acuminate segment similar to the lateral, basal pair of pinnae the largest and petiolate to 1 inch or more, deeper on the inferior side, the lower pinnules again pinnatifid both inferior and superior, those exterior to these stipitate, the superior pair shortly adnate-decurrent, 3-7 in. w.  $\frac{3}{4}$ -1 $\frac{1}{4}$  ft. l., cut down to 6-7 li., of the costae into broadish, oblong, curved, acuminate-serrate segments, which are close,  $\frac{1}{2}$ - $\frac{3}{4}$  in. w.  $1\frac{1}{2}$ -2 $\frac{1}{2}$  in. l., from the narrow or broadly open and rounded sinus, the margins cartilaginous edged, even within, the outer part sharply serrate; rachis channelled, green brown often sparsely spinescent outwards, costae echinate at the base of the ribs on the face and sometimes prickly also on the reverse side; veins copiously reticulated, areolae 2-3-4 serial, with free interior

branches, the costal arch absent and broken up; sori continuous to the serrated outer part of the segments; involucre narrow pale silvery.—*Litobrochia* Feè Fil. Ant. t. 8. fig. 2.

Guiana; in the Barima River region, a well marked very leafy species, all the parts being particularly broad. The prickles are fine and sparse, often quite absent. When small the rootstock with its cluster of buds is button-like, when larger it breaks into independent stocks, each having its own roots and free of the parent stock, forming eventually large clusters of independent plants close together. In Feè's figure of the Guadeloupe plant the costal arch in the venation is shown complete from rib to rib, but this is not the case in the island specimens I possess, which conform in this particular with the Guiana plants.—Porto Rico. Guadeloupe.

22. *P. bulbifera* Jenm.—Rootstock upright, fibrous, with bull-like, aggregated buds, that are clothed with densely appressed, rusty-coated scales; stipites  $1\frac{1}{2}$ -2 ft. l., tufted, stiffly erect, channelled, with the persistent scales of the buds at the articulate base; fronds ample, 3-4 ft. l., and as w., deltoid, bi-tripinnate, subcoriaceous, naked, dark green glossy on the upper side, paler beneath; pinnae in opposite or alternate pairs, the lowest largest and often branched again at the base on the inferior side, petiolate.  $1-1\frac{1}{2}$  ft. l. 4-8 in. w., with a long tapering serrated point 3-4 in. l., terminal one similar, deeply pinnatifid only, or the inferior fully pinnate within, segments subfalcate, or straight,  $1\frac{1}{2}$ -4 in. l.  $\frac{1}{3}$ - $\frac{1}{2}$  in. w., tapering, finely acuminate and spinulose-serrate at the end, with an open rounded sinus as wide as the segment between; rachis glabrous, brown or stramineous, with generally a few distant short spines on the upper part, the costae spinulescent above; veins forming 2-3 rows of areolae, with short exterior free veinlets, and with two unequal, disconnected narrow costal areolae between each pair of ribs; sori continuous below the outer spinulose, serrate part of the segments.—

Jamaica; infrequent in very wet forests above 2,000 ft. alt. Distinguished by the singular, separate, development of the fronds (the individuality of each of which produces the articulation of the stipes), less evident tripartite habit, conspicuously long (especially the terminal) and every acuminate segments, broad and rounded sinuses, fine and copious areolation of the veins, with very short, where evident, exterior free branches, and with disconnected (or entirely absent) costal areolae. The incipient fronds at first are like several nutlets or small bulbs aggregated together, each distinct, with its own separate rootlets, and coated with minute black and glossy subulate scales, which are mixed with dense, gray, scurf. The buds eventually burst and the frond develops, leaving the vestiture surrounding the base of the stipe. Though growing in community, with a common centre of origin, each frond is as it were a separate, independent plant. The occasional spine that occurs on the rachises, must not cause the species to be confounded with the copiously armed *P. aculeata*.

23. *P. propinqua*, Agardh.—Rootstock erect, clothed with minute brown scales; stipites tufted erect, naked,  $1\frac{1}{2}$ -2 ft. l., stramineous or brown channelled; fronds chartaceo-coriaceous, naked, bright green,  $1\frac{1}{4}$ -2 $\frac{1}{4}$  ft. l.  $\frac{2}{3}$ -1 ft. w., bi-tri-pinnatifid, with a terminal pinnatifid pinna and several erecto-spreading similar lateral ones, the basal pair of which are in some cases bi-pinnatifid, central ones 6-8 in. l.  $1-1\frac{1}{2}$  in. w., stipitate, deeply pinnatifid, passing at the apex into an entire tapering linear point; segments 2-3 li. w. rounded, curved, the lowest pair reduced and decurrent on the pedicel; rachises like stipites, costae spinulose at the base of the ribs on the upper side; veins angularly

areolated in two series, the outer branches free, midribs connected by a narrow costal arch, sori extending from the sharp or rounded sinus upwards but falling short of the sharply dentate end.—

Trinidad; Guiana; Appun. n. 586, Hostman n. 730. This differs from *aculeatum* and all the tripartite group though the basal pinnæ are the largest and most compound, by the fronds being deltoid-oblong regularly pinnated, diminishing gradually from the base upwards as in *breinervis*, and in the large compound species of *Nephrodium*. I take the indenting and description from specimens here referred in the Kew Herbarium. Appun's plant is, I think, most probably distinct, the lowest pair of pinnæ being simply pinnatifid like the rest, while in Hostman's Surinam plant they are again branched at the base.—Brasil.

24. *P. regia*, Jenm.—Stipites stout, erect, freely aculeated, 4-5 ft. l., brown, the base paleaceous; fronds subdeltoid, tripartite, quadri-pinnatifid, 5-6 ft. l. and w., the lateral lower divisions largest and more compound, chartaceous, naked, light green, the vascular parts light brown and glabrous, the rachis sparsely prickly at the base; largest central pinnæ  $1\frac{1}{2}$ - $2\frac{1}{2}$  ft. l. 6-8 in. w., pinnules connected, with an open rounded sinus or entirely disconnected and contiguous or twice or thrice their own width apart, 3-4 in. l.  $\frac{1}{2}$ - $1\frac{1}{2}$  in. w. serrate-acuminate, entire, or the larger cut in part or wholly, usually only in the centre on one or both sides, into oblique acute serrate-pointed lobes 2 li. w., and  $\frac{1}{2}$ - $\frac{3}{4}$  in. l. with an acute or broadly open rounded sinus between; veins fine, areolæ 1-2 serial with free forked or simple exterior branches, costal arch in complete falling short of the outer rib; sori continuous, or interrupted in the sinus reaching the serratures of the outer part of the segments.—Gard. Chron. 12th Jan. 1895.

Jamaica; 3,000-4,000 ft. alt., in woods in the Eastern parishes. The fronds are of a bright, light colour, resembling those of *aculeata* of which it may possibly prove to be the maximum state when fully known, though the material of this at present known, while suggesting does not confirm this conjecture.

25. *P. aculeata*, Swartz.—Stipites  $1\frac{1}{2}$ -2 ft. l., stramineous, slightly scaly at the base, freely beset throughout with short prickles; fronds ample, naked, thin and pellucid, pale green, tripinnate below, 3-4 ft. each way, tripartite, the lateral divisions greatly developed on the lower side  $1\frac{1}{2}$ -2 ft. l. 1 ft. or more w., petiolate, the inferior pinnula largest; pinnæ of the central division equilateral, contiguous, longest  $1-1\frac{1}{4}$  ft. l.  $2\frac{1}{2}$ -3 in. w., deeply pinnatifid and passing gradually into the serrate acuminate apex, the lower petiolate, the upper sessile, terminal pinnæ similar to the lateral; final segments contiguous  $1\frac{1}{2}$ -2 in. l. 4-5 li. w., broadest and connected at the base, the sinuses sharp or rounded, serrate, especially in the acuminate outer part, but not spinulose-toothed; rachis and costæ stramineous the former distinctly muricate below; veins fine, costal areolæ of the segments 2-3 serial, with copious free clavate exterior branches; sori falling short of the dentate point of the segments.—Plum. Fil. t. 5.

Jamaica; infrequent gathered on Mount Diablo, 2,000 ft. alt. the only locality from which I have seen the true plant. It is distinguished by the freely prickly stipites, costal areolæ reaching uniformly from base to base of the ribs of the final segments, pale straw colour, and deeper serration than of its allies. I have not seen the rootstock. There is much confusion in herbaria and books in regard to this species, and indeed to the whole group. The above description is taken from an entire frond, including the entire stipe to the base but as it is not completely fertile, it is likely that the mature size may be much larger while maintaining the same features in manner of branching and profuse prickliness

26. *P. hondurensis*, Jenm.—n. sp. Rootstock not seen; stipites erect, light brown or straw coloured, scaly only at the base, not prickly, ribbed down the face, rounded on the back; fronds tripartite, tripinnatifid, glabrous, glossy, pale green, chartaceous or firmer, pellucid; lateral divisions opposite, deeper on the under side, rachis, costæ and costulae all glabrous, stramineous and ribbed or channelled on the face; main divisions freely petiolated, as are also the lower pinnæ of the central part, secondary also petiolate, the outer becoming gradually sessile, the apex being pinnatifid; pinnules deeply pinnatifid to within 1-2 li., of the costules, 2-5 in. w.  $\frac{1}{4}$ -1 ft. l., segments 1-2 in. l.  $\frac{1}{4}$ - $\frac{1}{2}$  in. w., at the base, nearly straight and equal sided lanceolate, running to an acute or acuminate barely crenate point, the sinus open and rounded; veins areolated, costal arch absent or broken into loops, outer meshes narrow with parallel sides directed to the margin to which the branches beyond run free or sometimes connected; sori continuous around the sinuses and along both sides, terminating almost at the very tip of the segments; involucre narrow, silvery at first.

Honduras; on the coast region near Belize. This species is easily recognised by the narrow linear venation running nearly straight to the margin, no other species here described having similar narrow areolæ, the branches looking at first sight as if forked and free. Other features are the very straight direction and form of the segments, and the sori continuous to their very tips. The fern flora of the back or interior lands of Honduras has not been examined; that of the coast and country Belize is identical, with few exceptions, with that general in the lowlands throughout the West India Islands.

27 *P. elata*, Agardh.—Rootstock not seen; stipites strong, erect,  $\frac{1}{2}$  in. diameter 2-3 ft. l., paleaceous at the very base, channelled, pale dull brown, puberulous, devoid of prickles; fronds ample, tripartite, quadripinnatifid, 3-4 ft. l., and wide, deltoid, coriaceous, dark green above, paler beneath, naked, lowest pair of pinnæ much the largest, opposite, spreading, 2-2 $\frac{1}{2}$  ft. l. 1-2 ft. w., much deeper on the under-side, petioled 1-2 in., tripinnatifid, the basal branch on the inferior side the largest; next pair above these large lateral divisions on the primary rachis distant, bipinnatifid at the base, those above gradually reduced, nearer, and simply pinnatifid, passing into the wide pinnatifid terminal portion, the inferior petiolated, superior sessile and 6-9 in. l. 2-4 in. w. echinate at the base of the final ribs on the upper surface; segments numerous, spreading, 1 $\frac{1}{2}$ -2 in. l.  $\frac{1}{4}$ - $\frac{1}{3}$  in. w., straight or curved lanceolate-acuminate or attenuated, connected by a narrow wing, the sinuses broadly rounded, becoming narrower, in the outer series; veins pellucid sericeous beneath at first, meshes 2-3 serial, with free exterior branches, costal arch absent or in two loops; sori disconnected in the sinus, continuous to the serration of the acuminate or acute apex; involucre narrow, firm, pale at first.—

St. Vincent, Grenada; a well marked plant easily distinguished at sight from other West Indian species. It seems to attain affluent proportions, judging by a branch of a lateral primary division, the inferior pinnæ of which was 10 in. w., and 1 $\frac{1}{2}$  ft. l., the lower side the deeper, the pinnulæ uniformly pinnatifid. I take Christ's identification of a Porto Rico specimen. Kuhn. referred it to *P. altissima*, Poir, with other distinct West Indian species, and Baker to *aculeata*.

28. *P. longibrachiata*, Agardh.—Caudex erect., reaching sometimes a foot in length, 6-8 in. diam.; stipe sometimes 6 ft. long, 2 $\frac{1}{2}$  in.

diam., at the base; frond deltoid, 5-6 ft. long and broad, composed of five primary bipinnate divisions, an end one and two side ones forked low down; final pinna lanceolate nearly a foot long, 3-4 in. broad, cut down to a narrowly winged rachis into contiguous lanceolate entire final segments  $\frac{1}{3}$ - $\frac{1}{2}$  in., broad; texture moderately firm; both surfaces glabrous; veins anastomosing copiously; sorus narrow; indusium narrow, glabrous.

St. Vincent; this I have not seen. The description is taken from Mr. Baker's paper in *Annals of Botany*, vol. V. No. XVIII, April, 1891.

29. *P. multiserialis*, Jenm n. sp.—Rootstock very stout, upright, rising above the ground; stipites caespitose, finger-thick, rounded on the back ribbed down the face, wood-brown sparsely prickly and scaly at the base, 3-5 ft. l., fronds 3-4 ft. l., tripartite by being similarly branched on the inferior base, each division bipinnatifid, chartaceous, pellucid, dark green, naked, rachises like the stipes; pinnae: the inferior opposite, and petiolate, the superior alternate and sessile, spreading nearly horizontally, the lower 1-2 ft. l. 3-6 in. w., terminating in an entire acuminate faintly serrulate segment  $1\frac{1}{2}$ -3 in l., and  $\frac{1}{2}$  in. w., pinnatifid within this to  $1\frac{1}{2}$ -2 li. of the pale brown or straw coloured costae; segments close, numerous, wide spreading, somewhat curved, entire, faintly crenulate or not at the usually acute apex,  $\frac{1}{3}$ - $\frac{1}{4}$  in. w. 2-3 in. l., veins freely areolated, the meshes angular and 4 serial, the costal span absent, or present and linear only in the outer parts of the pinnae and their falling short of the outer costal rib which curves at the base to it; sori continuous not connected at the sinus nor reaching the outer part of the segment, involucre narrow, pale.

Trinidad; at Aripo, and Chaguaramas, gathered by Hart, Lunt, and other collectors, resembling very closely *P. gigantea*, Willd. but differing in several particulars and markedly in the venation, the meshes of which are smaller, angular and multiserial filling the whole space from midrib to margin, instead of 1-2 serial, with the outer branches long, parallel and free as is uniform in that species. It was gathered by Purdie at Mararcas River Head, 28th May, 1848.

30. *P. gigantea*, Willd.—Rootstock very stout, upright, scaly; stipites caespitose, stout, erect, 4-6 ft. l. 1 in. thick, scaly only at the base sharply prickly throughout, tri-ribbed down the face, dark brown fronds erect, tripartite, 4-6 ft. each way, dark, green, naked, coriaceous, the lateral divisions nearly as large as the central, branched at the base on the inferior side; pinnae 1-2 ft. l. 4-6 in. w., the inferior opposite, the superior alternate, uniform in width from the base outwards, with a lanceolate serrate terminal segment, sessile or shortly petioled, deeply pinnatifid the largest sometimes bipinnatifid at the base on one or both sides; segments ligulate, 2-4 in. l.  $\frac{1}{3}$ - $\frac{1}{2}$  in. w., the apices acute or acuminate and serrate with rather bluntish teeth beyond the lines of sori which extend from the close or open sinus; rachis and costae channelled, dark or pale brown, the former more or less prickly, the later spinescent on the face; veins forming 1-2 3 series of areolae, with exterior long, parallel free branches, the shallow linear transverse costal arch reaching from rib to rib—Plum. Fil. t. 11. *P. crassipes*, Agardh.

Jamaica; infrequent in very moist forest at 2,000-3,000 ft. alt; gathered at Big Level, Wallenford, and Dollwood, St. George, Portland. This and the following

species may be readily recognised by their large size, even in herbaria specimens, the pinnae being twice or thrice larger than in any of their allies. The final segments are not falcate, but spread right and left, nearly horizontally, or serrate only in the outer part, whether fertile or not, and the serration is coarse and not spinulose as in the preceding. Plumier's plate show a portion of the top of a frond, and part of the base of a stipe. It is represented in Sloane's Herbarium, collected by Dr. Houston in 1730. The simpler venation distinguishes it from the next species—Martinique and probably other islands and the mainland.

31. *P. Hartiana*, Jenm. n. sp.—Fronde very ample, tripartite, lower lateral branches largest, and the branches on their underside larger than those of the upper and again branched; chartaceous, glossy, naked, dark green above, pale beneath; rachis costae and costulae dark brown, channelled, glossy, quite devoid of prickles; central pinnae 1-1½ ft. l. 5-8 in. w., stipitate terminating in a pinnule similar to the lateral' which are oblong, lanceolate acuminate, 4-5 in. l. ½-¾ in. w., all connected by a wide wing with a broadly rounded oblique sinus of the same width, sharply serrated in the outer finely attenuated ends; veins areolated, meshes angular, small, multiseriate, 4-5 deep, the exterior very short branches connected by the thread-like receptacles, free in the barren parts. costal arches absent or narrowly linear and interrupted, forming longer and shorter very shallow arches; sori linear, falling short at the serrations of the outer part, continuous along the sides and round the broad sinuses, where it is barely interrupted in the corner; involucre brown, very narrow, almost hidden at maturity.

Trinidad; This is a very striking species among several that are remarkably fine, and of conspicuous individuality. The features most obvious at first sight are the broad final pinnules, and the wide obliquely rounded sinuses the same width as the pinnules themselves, which features extend right out to the spear-like terminal pinnule, which is as broad and long as the rest. Perhaps and even more important specific distinction is the multiplicity of fine areolae in the network of the venation, exceeding that of any other species here, and which is uniformly 5-seriate in all the fertile parts. The specimens described are in the Trinidad herbarium of the native flora. The rootstock and petioles are not represented. Collected by Lunt and Alexander.

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32. *P. heterophylla*, Linn.—Stipites densely tufted, slender, 6-10 in. l., channeled, green, naked, arising from a fibrous scaly rootstock; fronds separately sterile and fertile, ovate-acuminate, 5-10 in. l., 3-5 in. w., firm but herbaceous, naked, bright green, the upper side glossy, bi-tripinnate; pinnae few, erecto-spreading, subdistant, the lowest largest and bipinnate, the several next above simply pinnate, passing gradually into simple segments at the apex with a similar terminal one; final segments distant, oblique, linear-oblong or ovate, ½-1¼ in. l. 1½-2 li. w., blunt or acute, the base cuneate-stipitate, margins even in the fertile' deeply and uniformly serrate in the barren fronds; rachis and costae green, naked, both flattened or margined in the outer part; sori continuous to almost the apex of the segments; involucre pale and rather silvery.—Sloane f. 53 ft 2 Plum. t. 37

Bermuda, Jamaica; common on wet rocks at low elevations in or near the beds of streams, abundant in the eastern parishes of the latter country up to 2,000 ft. alt., and in open caves and on cliffs in the Walsingham track of the

former, when in favourable locations it grows to a very large size. A pretty, distinct, looking plant of no close affinity, of very lax habit, all the segments, being  $\frac{1}{2}$ - $\frac{3}{4}$  in. apart, with coarser cutting, but somewhat the habit of *Onychium*, to which Kuhn referred it. It grows only near shady springs and in woods on calcareous rocks over which water constantly trickles, in strong tufts, with numerous grass green quite erect fronds, the barren outside, and fertile, rather taller, inside.—Cuba, Haiti, San Domingo, Brasil.

33. *P. leptophylla*, Swartz.—Rootstock slender, erect or oblique, slightly scaly; stipites tufted, slender, erect, stramineous, brown and furfuraceous at the base, 5-9 in. l., channelled; fronds erect, sub-deltoid, 5-8 in. each way, pale green, glabrous, glossy, membrano-chartaceous, pellucid bi-tri-pinnatifid lowest pair pinnæ much the largest, compound, with deeply pinnatifid pinnules especially on the inferior side similar to the upper pinnæ; final segments decurrent at the base, lining the rachis or costæ with a narrow wing, linear or linear-oblong,  $1\frac{1}{2}$ -2 li. w. 1-2 in. l. even edged or spinulose serrate where barren; veins open, forming an imperfect series of costal areoles, or forked and free; sori continuous along the margins, but not reaching as a rule the ends; involucre pale, membranous, the edge plain or fringed.—Hook Gard. Fer. t. 23. *P. gracilis*, Feè. Hook sp. Fil. vol. 2. p. 172 t. 128.A.

This has the size and habit of *P. mulilata* and *P. heterophylla*, with similar segments. The most fertile fronds are as a rule more compound than the less fertile and the barren. In the former the lower pair of pinnæ and the upper part of the frond are simply pinnatifid, the segments being linear,  $\frac{1}{2}$ -1 in. apart, and slightly connected by a decurrent narrow wing to the rachis. In the less fertile and barren those parts are bipinnatifid with relatively close, but still decurrent segments. The teeth of the barren margins are conspicuously armed. The venation is very variable; it is very open, and mostly free and forked, but casually or frequently contiguous veinlets unite forming costal areolæ.—Cuba, Portorico, Venezuela and Brasil.

34. *P. ciliaris*, Eaton.—Stipites  $\frac{3}{4}$ -1 ft. l, glabrous, glossy, light brown or stramineous; fronds a span and a half to 2 spans l, and about the same w., ovate,—deltoid, naked, papyraceous, tripinnate; rachis and costæ naked, stramineous; pinnæ spreading, lowest distant, bi-pinnate, about 3 in. l., and w., the superior and terminal ones simple, 2 in. l.  $1\frac{1}{2}$  li. w., central forked from the base, segments narrow, sori along the sides not reaching the apex, veins lax, anastomosing forming costal arches, outer free.

Cuba; was found by Wright. It may be looked for in some of the adjacent large islands.

35. *P. incisa*, Thunb.—Rootstock wide-creeping, clothed with fine subulate scales; stipites scattered, strong erect, subangular, dark, polished, naked,  $1\frac{1}{2}$ - $2\frac{1}{2}$  ft. l.; fronds 4-8 ft. l. 2-4 ft. w., tripinnate, sub-coriaceous, naked, dark green and glossy above, glaucous beneath; pinnæ erect, spreading in distant sessile, opposite pairs,  $1\frac{1}{2}$ -2 ft l. 6-10 in. w., ovate-lanceolate, the acuminate apex entire; pinnulæ sessile in opposite pairs, usually sub-distant, lanceolate, 3-5 in. l.  $1-1\frac{3}{4}$  in. w., pinnate at the base, pinnatifid in the outer part terminating in a rather long, broadish, subentire point; final segments oblong (the smaller deltoid—oblong) blunt on acute,  $\frac{1}{2}$ -1 in. l. 2-4 li. w., broadly adnate at the base, entire or the inferior sinuate or shallowly

and roundly lobed; veins prominent beneath, pellucid, forming a row of costal areolæ, the numerous branches of which are free or casually united; sori reaching from bottom to top of the lobes.—*P. vespertilionis* Labil *P. glauca*, Moritz.

Jamaica, Dominica, Guiana; frequent among brushwood on open hillsides and the skirts of forests at from 4,000-6,000 ft. alt. This, like *viscosa*, is subsucculent in its larger states. It has a general bluish tinge, like the bloom on certain kinds of fruit. The lowest, and reduced, pair of pinnules lap over the opposite pair on the face of the rachis. The venation is variable,—quite free in parts, or with a line of costal areolæ, the exterior branches free or more or less anastomosing near the margin. The colouring of the different parts is beautifully clear and bright, especially of the rachis and costæ, both of which are channelled, widely spread in the Eastern and Southern Hemispheres, Africa and South America.

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36. *P. deflexa*, Link.—Rootstock stout, woody, obliquely erect, clothed with narrow dark rather spreading scales; stipites cæspitose, strong, channelled, asperous beneath and scaly at the base, 2-4 ft. l., light or dark brown; fronds coriaceous, ridged, dark green and glossy above, paler beneath, naked except the ribs beneath which are rather puberulous, tripartite, quadripinnate, 2-3½ ft. l., and about as w., subdeltoid, central division equilateral, the basal divisions distant and their primary branches on the lower side much enlarged, the inferior 1-1¼ ft. l. ¾ ft. w., bi. (or rarely tripinnate), the branches on the upper side much reduced and simply pinnate, or tripinnate at the very base; ultimate segments linear ½-1½ in. l. 2 li. w., straight or curved, mucronate, spinulose at the base above, subdistant, free on the superior side of the base, adnate on the lower barren segments broader, and the margins spinulose-serrate in the outer third, rachis and costæ rather scabrous, slightly scaly in the axils, brown, channelled, veins, simple or forked, the lowest in barren fronds often springing from the costæ; sori reaching from the base to the mucronate apex of the segments *P. stridens*, Agardh.

Jamaica; frequent in the primeval forest of the higher ridges and peaks above 6,000 ft. alt., attaining the highest elevation of any members of the genus. A large plant, the most rigid, hardly excepting *aquilina*, of any. Only full-grown plants exhibit the tripartite habit. The continental forms have much smaller divisions and final segments a third to a sixth smaller—hence Agardh named the Jamaica plant *P. stridens*; the habit and other characters are however the same in both. Plumier's figure, on the right of the page, is an exact representation of the outline of a young frond.—Venezuela to Brasil and Peru.

37. *P. aquilina*, Linn.—Rootstock pencil-thick, wide-creeping subterraneous; stipites scattered, erect, 1-3 or more ft. l. naked, stramineous; fronds large, deltoid or elongato-deltoid, tri-quadripinnate 2-4 ft. l., about as w., coriaceous and rigid, pale green, upper side naked, under coated with very fine light silky tomentum; pinnæ approximate or more or less distant, the outer part simply pinnate; tertiary with a straight linear apical segment and similar or much shorter close lateral ones ¼-½ in. l. 1-1½ li. w., rachis and costæ stramineous ribs slightly puberulous-scaly; veins fine, forked or simple; sori continuous around the lobes, with a slight interior involucrel valve as well as the normal exterior one.—*Pæsia*, St, Hil. *Ornithopteris* Agardh.—Eat. Fer. N. Am. Pl. 35.



var. *P. esculenta*, Forst.—Final segments, especially in the outer part of the primary and secondary divisions where they are most apart, connected at the base by an arc-like auricle.

var. *P. caudata*, L.—All divisions more open, the longer final segments 6-8 li., apart, longer, narrower and not connected by the shallow transverse auricle, but the outer slightly decurrent, the terminal caudate, 1-1¼ in. l. 1-½ li. w.; hardly less tomentose beneath—Plum. t. 29. Sloane t. 63.

Bermuda, to Guiana; most abundant from sealevel upwards, covering swamps, savannahs, open hillsides and ridges, waysides and the skirts of forests. Plants in shade are more lax and straggling in habit, and often reach as much as 12 ft. high, supported by other vegetation. All the forms are less compact and vary in other particulars more or less from the European brake-fern or bracken. The rachises &c. are sometimes chestnut brown, and the ribs of the ultimate pinnules and segments are flat on the under side and scariose-margined. A cross section of the petiole shows several distinct bundles of vessels. The varieties are equally common. The double involucrel valves would entitle this and the next species to both generic and tribal distinction. Nearly universal over the temperate and tropical regions of the world, reaching north as far as the arctic regions.

38. *P. viscosa*, Moore.—Rootstock wide-creeping, slender, finely scaly; stipites scattered, distant, rather slender, 1-1½ ft. l., dark-coloured; fronds pale green, coriaceous-herbaceous, puberulous-scaly and viscid, tri-quadrifid, 4-6 ft. l. or more 2-4 ft. w. composed of several distant alternate spreading or erect-spreading, ovate pinnæ which are 1-2 ft. l., ½-1 ft. w.; pinnulæ close or sub-distant, lanceolate, sessile, 5-8 in. l., 1½-2 in. w., the acuminate apices bidentate-serrate; tertiary segments numerous, ⅓-1 in. l., ¼ in. w., the outer part entire and acute or blunt-pointed, within deeply pinnatifid, final lobes short, deltoid-ovate, blunt, 1½ li. l., by nearly the same w., rachis costæ &c., reddish brown, rusty-glandulose, and flexuose or the former zigzag; veins free, forked, pinnate flabellate; sori continuous on the lobes; involucre double.—Hook Sp. Fil. vol. 2, t. 121 B. and vol. 3 t. 141 C.

Jamaica; common, growing among brushwood, upon which it is subscandent, and along the skirts of forests, often in company with *P. incisa*, from 5,000-6,000 ft. alt. Every part is densely glandulose-viscid, the pinnæ nearly sessile, and their lower pinnules reduced especially the lowest of all on the superior side, the rachises and costules reddish. In a fresh state the interior valve of the involucre is clearly visible, and the veins pellucid. The colour is a bright peculiarly light green.—Venezuela and Peru..





## WEST INDIAN AND GUIANA FERNS.



THE publication of descriptions of the West India and Guiana Ferns was suspended owing to the death in 1902, of the author, the late Mr. G. S. Jenman. We are now able to continue the issue from original MSS., and hope to be able to carry the work to completion. The present issue contains the genus *LOMARIA*.

### TRIBE VIII.—LOMARIEÆ.

**SORI** marginal, medial or sub-costal, linear or oblong, situated on a linear receptacle transverse with the veins. Involucres exteriorly attached, inflexed or involute, free and opening from the inner-side, membranous or coriaceous, permanent or deciduous. Sporangia stipitate, with an incomplete vertical ring. Fronds varying from simple to tripinnatifid, coriaceous or chartaceous; with free or united veins; fertile and barren, uniform or different.

*Lomaria* the first genus here agrees with the preceding tribe in possessing marginal sori, but in the other members the sori are situated not along the margin, but at a point distant from it, usually near to and parallel with the midrib. In three of the five genera, *Blechnum*, *Sadleria*, and *Woodwardia*, it forms a single line or series on each side of and near the costæ, but in *Doodia* there is occasionally a second series between the first and the margin. Only the first, second and fourth of the five are, however, found in the West Indies. The third is almost entirely confined to the Sandwich Islands, while the fifth is Australian, extending thence to Polynesia and Ceylon.

### GENUS XX.—LOMARIA, Willd.

**SORI**, marginal, linear and continuous, when mature filling the entire space between the costa and margins of the contracted pinnae. *Involucres* special, the same shape as the sori, continuous, inflexed, or involute, the opposite valves connivent at first on the back of the costæ, at length open. *Receptacles* formed of the transverse union of the veins. *Fronds* dimorphous, pinnate, or bi-pinnate, naked or scaly and coriaceous; *Veins* free, forked.

Nearly all the members of this rather small genus are very homogeneous in character. They are confined chiefly to the cool altitudes within the tropical zone, or the temperate regions beyond. Few attain a large size, though one has a stout erect, fibrous rootstock which reaches eventually three or four feet high. Some are found on wayside banks in full exposure to the sun; others prefer the shade of deep forest, where they grow among rocks and stones; others again have free-repent rhizomes, which ascend the trunks of trees many feet, clinging with firm tenacity; and as in *Blechnum* there is one twining species. On casual inspection the line of sori seems as much costal as marginal, but on examination it is found that although the sporangia fill the whole space between, the receptacle or line of attachment is strictly marginal, with a narrow line and membrane intervening between the costa. The barren fronds are permanent, but the fertile soon wither and drop away. Between 50 and 60 species are known, nearly half of which are found in Australia, New Zealand and the adjacent Islands. About a dozen belong to the West Indies and Tropical America, chiefly confined to elevated regions, and three to temperate South America. Two inhabit the North temperate zone. Only five or six are found in Tropical Asia and Africa, and two in Cape Colony and Natal.

Rootstock freely repent; fronds essentially or fully pinnate; pinnæ broadly adnate at the base. Epiphytical.

Veins immersed, depressed beneath.

1. *L. onocleoides*.—Spreng.

2. *L. attenuata*.—Willd.

Veins raised on both sides.

3. *L. Feeii*.—Jenman.

Rootstock elongated, erect or decumbent; fronds essentially or fully pinnate; the pinnæ fully adnate at the base. Terrestrial.

4. *L. L'Herminierii*.—Bory.

5. *L. Plumierii*.—Desv.

Rootstock short, erect or decumbent; fronds pinnate; pinnæ free at the base. Terrestrial.

6. *L. procera*.—Spreng.

7. *L. Boryana*.—Willd.

Fronds bi-pinnate, twining several feet high on bushes. Terrestrial.

8. *L. Volubile*.—Hook.

1. *L. onocleoides*, Spreng.—Rootstock stout, as thick as one's finger or less, long-creeping up the stems of trees, densely clothed above with linear-subulate chestnut coloured ciliate edged scales. *Stipites* several, erecto spreading at the top of the rootstock, stiff, slightly channelled, naked except at the dark coloured base 2-4 ins. long. *Fronds* linear or oblong-lanceolate 1½ ft. l., 1½-2 in. w., pinnate. Barren, narrowed at the base to two or three contiguous or sub-distant much reduced lobe-like or merely rudimentary segments. Coriaceous, naked, light green, paler beneath. *Pinnæ* close, acuminate or acute, broadest at the base where they touch each other, but are barely connected, 1-1¼ in. l., ⅜ in. w., margins entire or sub-crenulate; Rhachises channelled down the face, sharp-ridged beneath; veins spreading, simple forked, immersed, slightly depressed on the under surface. Fertile Fronds rather broader; the pinnæ linear ¼ to ½ in. apart narrowed and then slightly dilated at the base, the lowest rudimentary. Hook sp. Fil. Vol. 3 t 146, Syn. Fil. p. 178.

Jamaica. Infrequent at 4,000-6,000 ft. altitude on trees in damp forests; St. Vincent. The veins are immersed and faintly channelled beneath, the surfaces rather glossy, the apex of the frond terminating in an oblong lanceolate-acuminate entire pinna. The segments of the fertile fronds are 1-1½ in. l. 1-2 l. w. with the involucre dark entire; the terminal segments being caudate. It is much less frequent than *L. attenuata* which it closely resembles though rather more coriaceous and stiffer. United with *L. attenuata* by Grisebach in Flor. B. W. Indies. This and three following have a close general resemblance.

West Indian Islands and Equador.

2. *L. attenuata*, Willd.—Rootstock, as thick as ones thumb, freely repent, perpendicular, ascending stems of trees, densely clothed at the top with long linear acuminate ciliate-edged castaneous scales. *Stipites*, erect or erecto-spreading, naked except at the base, 4-8 in. l. strong and stiff, sub-cylindrical, and slightly channelled beneath, dark brown. Fronds oblong lanceolate, pinnate, 1½-2 ft. l. 2½-4 in. W. Barren reduced at the base to distant merely rudimentary lobes, Coriaceous, naked, light green, paler beneath. *Pinnæ* close, broadest at the base where they are barely connected, tapering outwards, and

accuminate, slightly curved.  $1\frac{1}{2}$ –2 in. l.  $\frac{1}{2}$  in. w. or rather less, the margins entire, even rachis rounded on the face but narrowly channelled, the undersides rather flat, rounded and dark brown on the lower part, the upper pale and rather rigid. Veins simple or forked close spreading, immersed, the surface depressed beneath. Fertile fronds broader, ovate-lanceolate; the pinnæ linear 3–4 in. l. 1–2 l. w. not dilated at the base or the underside, very slightly decurrent. 5–6 l. apart. Involucres dark brown, entire. Hook and Baker. Syn Fil. p. 176. Grisbach's Flora, p. 673. Jamaica, Dominica, St. Vincent, and Grenada.

Very abundant in damp forests on trees from 3,000–6,000 ft. altitudes, a larger and stronger plant than preceding. The scales of the rootstock very abundant tapering, very finely undulate and ciliate edged outwardly. The barren fronds terminate in an oblong-lanceolate-accuminate pinna. They are thrown out in alternate tiers with the fertile, but at different seasons of the year generally. Common on trees in Jamaica in damp districts very widely distributed Cuba to Juan Fernandez—Polynesia—Cape Colony. The group wants further examination in the wild state.

3. *L. Feeii*. Jenman. Rootstock free creeping, ascending the trunks of trees, densely clothed in the growing part with linear-accuminate fine dark brown scales; stipites erecto-spreading, several, strong, cylindric, narrowly channelled, scaly at the base like the rootstock 3–6 in. l. Fronds lanceolate pinnate  $1\frac{1}{2}$ –2 ft. l. 3–4 $\frac{1}{2}$  in. w. Barren with a lanceolate-accuminate terminal pinna 2 in. l. roundly lobed at the base, coriaceous, naked pale, the under sides lighter. Pinnæ 2–2 $\frac{3}{4}$  in. l. 4 l. w. straight or rather curved, spreading, very acuminate barely connected at the expanded bases in the upper part of the frond, in the lower half narrowed at the base  $\frac{1}{4}$ – $\frac{1}{2}$  in. apart, the basal ones reduced, and most narrowed downwards and  $\frac{1}{2}$ –1 in. distant veins raised on both sides, close, spreading, simple and forked the clavate apices forming a raised connected intramarginal line; margin beyond this line very thin, even or faintly and indistinctly, serrulate in the finely acuminate outer part; Rachis channelled, on the face, beneath rather flat, rounded on the lower part and dark. Fertile fronds somewhat slender, not wider, rather truncate at the base and the stipites rather shorter, the pinnæ linear  $1\frac{1}{2}$ –2 in. l. 1 l. w. not dilated at the base about  $\frac{1}{2}$  in. apart, involucres dark, entire, *L. Plumierii* Fee, Fil: Ant: t. 4.

Jamaica. Infrequent at 4,000 ft. altitude ascending trees. Gathered at Moody's Gap a pass in the mountain chain between St. Andrew and Portland. It is well marked from the rest of the group, by the pinnæ in the lower half of the barren frond being separated by an increasing space towards the base where it reaches from  $\frac{1}{3}$ –1 inch by the same pinnæ being narrowed downwards the lower reduced ones most so, those of the upper half of the frond being dilated or connected; and by the veins being raised on both sides, their transversely clavate apices forming a prominent intramarginal line. The reduced pinnæ at the base of the barren fronds are sharp-pointed like the rest, (unlike Fee's figure in the Jamaica plant, only one or two of the pinnæ of the fertile fronds are rather shorter than the rest. In this and the foregoing species the fertile pinnæ resemble slender linear pods.

4. *L. L'Herminieri*, Bory.—Rootstock terrestrial, erect, slender, elongated and reaching a span high, freely clothed with linear acuminate castaneous scales. Stipites plumose from the top of the rootstock 3–6 in. l. dark brown beneath, narrowly channelled and light coloured on the face, cylindric. Fronds lanceolate or oblong—lanceo-

late pinnate 12–18 in. l. 3–4 in. b. Barren reduced at the base coriaceous, glabrous, and somewhat glossy, the underside paler than the upper. Pinnæ close, broad cut at the base, where they are barely connected, acuminate or acute  $\frac{1}{2}$  in. w.  $1\frac{1}{2}$ – $1\frac{3}{4}$  in. l. the basal ones suddenly or gradually reduced, deltoid or rounded, the lowest shallow lobes 1 line deep. Veins close forked immersed, impressed on the surface beneath, spreading. Rachis brown or dark coloured, flat in the lower half, beneath paler, ridged in the upper part. Fertile fronds lanceolate or ovate-lanceolate, the pinnæ 2–3 in. l.  $1\frac{1}{2}$  l. br.  $\frac{1}{2}$ –1 in. apart. Involucres entire dark coloured Hook Gard. Ferns t. 40. Syn. Fil. p. 176.

Jamaica. Infrequent at 5,000–6,000 ft. altitude in moist forests. This has much the appearance of the three preceding species, but is strictly terrestrial growing hundreds together on the forest floor. The reduced pinnæ at the base are connected and gradually rounded, only the lowest of all being slightly separated and very small not distant and rudimentary as in *L. Plumierii*. The fertile fronds are not reduced at the base. The pinnæ are straight or curved, the margins even but finely crenulate in the outer part and the veins are slightly wider than in the preceding, the colour being rather darker and duller.

Guadeloupe and the mainland as far south as Chili.

5. *L. Plumierii*, Desv.—Rootstock terrestrial decumbent or erect, elongated, moderately stout. Stipites cæspitose, erect, 6–10 in. l. scaly at the base, dark brown or blackish, flat and channelled down the face. Fronds ovate-lanceolate sub-coriaceous dark green and glossy above, paler beneath, naked,  $1\frac{1}{2}$ – $2\frac{1}{2}$  ft. l. 6–9 in. or, fully pinnate at the base, deeply pinnatifid above and gradually passing into the entire lanceolate or ligulate acuminate terminal, reduced at the base and passing gradually or abruptly in distant rounded auricles, which dwindle into glands at the base of the stipites, to which they extend. Pinnæ spreading, 3–5 in. l. 8–10 l. w. above the base, acute or acuminate, sub-falcate, the margins entire and even or slightly serrulate at the point. Veins spreading, oblique, distant but not raised, forked, branches 1 l. apart running into the margin, with glandular clavate apices. Rachis strong, flat, slightly channelled on the face rounded beneath, purple brown. Fertile fronds the same size and shape, but stipites much longer the pinnæ linear 1–2 l. b., an inch or more apart, with a membranous dilated base. Involucre continuous entire. Hook and Bak Syn. Fil. p. 176. *L. divergens* Kunze Gr. Fl. B. W. I. p. 673.

Jamaica, Dominica and Guiana. Infrequent in very damp forests, on stony ground from 3,000 ft. upwards. It is a very clearly and well marked species having its nearest affinity with *L. attenuata* group, from which its different habit of growth obviously distinguish it. The pinnæ are all fully aduate to the rachis, and the majority slightly united, only those towards the base being disconnected and shortly apart. These are gradually or suddenly reduced to shallow rounded lobes, which pass downwards into mere glands on the sides of the stipes. The dilation of the bases forms an open space between the pinnæ. The sinuses are acute, or rounded. *L. exaltata* Fee. Fil. Ant. t. 3. if not typically this, is a form apparently without basal auricles to the fronds. French Islands and from Venezuela to Brazil and Peru.

6. *L. procera*, Spreng.—Rootstock stout, short, decumbent or oblique. Stipites cæspitose, several or many, strong, spreading or pendant. 9–18 in. l. thickly palaceous, especially at the base and often asperous. Fronds lanceolate oblong or ovate lanceolate, 1–3 ft. l. 4–12 or more in. w., with a linear-lanceolate terminal pinnæ and

numerous close or sub-distant spreading lateral ones, the base truncate; very stiff and coriaceous; dull green, but the upper side rather glossy; more or less copiously palaceous on the rachis and on the ribs beneath. Pinnæ contiguous or  $\frac{1}{2}$  in., or more apart. 2-6 in. l.  $\frac{1}{3}$  to  $\frac{3}{4}$  in. w. acute or acuminate the base sessile and cordate. Veins fine and close, terminating in the membranous margin. Fertile fronds conform in size and shape similarly freely palaceous; stipites much longer; pinnæ linear 2 l. w. rounded and free at the base; involucre revolute, dark coloured much broken at maturity. Hook. Icon. Fil. t 127, 128. Hook. Garden Ferns, t 23. Hook. & Bak. Syn. Fil. p. 179. Grisebach's Flora, p. 623. Jamaica, St. Vincent and Guiana.

Most abundant on banks and open hillsides from about 2,500 ft. altitude upwards; the commonest species of all delighting in exposure to the sun, and in Jamaica growing together in extensive communities; especially at 4,000-6,000 ft. altitude. It is a variable plant especially in size, but may in any size or form be easily recognized by its dense palaceous vestiture. The fronds are not reduced at the base or only one or two joints of the pinnæ are a little shorter. In some cases the pinnæ are deeply auriculed at the cordate base, and in others as those of Guiana they are more rounded than cordate. The veins spread nearly at right angles, and the surface is striated or not. There are two forms which have had distinctive names given to them;—*Striata* (Willd), in which the pinnæ are acuminate and serrate at the apex; and *Lineata* (Willd), in which they are acute and entire or faintly crenate. In Jamaica specimens the pinnæ vary from an inch to nearly a foot long.

French Islands. Mexico to Chili, and in Southern Hemisphere.

7. *L. Boryana*, Willd.—Caudex. sub-arboreous, erect 2-3 feet high, very stout, densely covered with long dark subulate scales. Stipites strong cæspitose, erecto-spreading 6-12 in. l. more or less scaly, with a tuft of scales like those of the caudex at the base. Fronds oblong or ovate lanceolate, pinnate,  $1\frac{1}{2}$ -3 ft. l. 10-15 in. w. with a terminal linear lanceolate free or nearly free pinnæ and numerous spreading lateral ones, the base somewhat reduced. Pinnæ close, or the lower ones sub-distant 4-7 in. l. an inch or less wide, free and rounded at the base, the reduced lower ones suddenly passing into mere alternate gland like scars on the face of the stipites which reach to the bottom, upper ones gradually becoming aduate; margins even and entire, or subserrulate in the outer part. Rachis strong channelled and freely fibrillose, dark green above, paler beneath. Veins close, spreading forked or simple  $\frac{1}{2}$  l. apart, the clavate apices glandulose above. Fertile fronds conform in shape, pinnæ linear, 2 l. w. distant 8-9 in. l. involucre revolute much lacerated, and split at maturity. Hook. and Bak. Syn. Fil. p. 180. *L. magellanica*, Desv. Hook. Gard. Ferns. t 52. Grisebach p. 674. *L. Schomburgkii*. Klotzsch.—*L. Ryanii* Kaulf.

Jamaica, Montserrat, Guiana.

In Jamaica it is scattered, a plant here and there and not frequent generally above 5,000 feet altitude. In Montserrat it was gathered by Ryan, and in Guiana at Roraima. A fine species, with the fronds erect spreading from the top of the caudex, which is very stout at the base, and tapers to the top. Its nearest ally is doubtless *L. procera*, from which the arborescent caudex, the stiffer habit, and long subulate vestiture of the stipites and caudex, with pinnæ rounded, not cordate at the base the superior ones being more aduate, very conspicuously distinguish it. It is very widely distributed and is consequently variable in character and of very extensive synonymy. The fertile fronds are longer in the stipe and pinnæ than the barren. The Guiana plant is stiffer than the Jamaican,

the pinnæ closer, more rigid, and directed upwards at an acute angle with the rachis. The fertile also stiff, closer and broader than the corresponding pinnæ of the Jamaica plant. Jamaica—southwards to the Straits of Magellan; South Africa; Madagascar, Bourbon and Mauritius.

8. *L. Volubile*, Hook. Fronds, arising from a terrestrial root-stock and twining several feet high on bushes or young trees. Rachis thick as strong twine, very flexuose and often twisted, channelled, glabrous, sterile pinnæ naked coriaceous, paler on under side, composed of a long terminal pinnule and two or three pairs of opposite lateral ones, below which is a naked petiole 1–3 in. l. Pinnulæ linear-lanceolate, acuminate or cuspidate, rounded and stipitate at the base, 6–9 in. l. 1–2 in. w.; margins even below the serrated outer part: Costæ channelled down the face, rounded and raised beneath, stramineous, veins spreading nearly at right angles from the mid-ribs, simple and forked, nearly a line apart running into the slightly thickened margins. Fertile pinnæ superior to the barren, similar in form, but contracted, the pinnules only 2 l. w. with a pale pellucid streak of membrane on either side of the prominent pale mid-rib, which is edged and usually hidden beneath by the continuous marginal sori. Involucres a cinnamon brown, revolute, much lacerated and split into shreds at maturity. Hook Sp. Fil. Vol. 3 t 150. Hook and Bak. Syn. Fil. p. 182.

Guiana, Jenman No. 1466, gathered on the banks of the Chinabowa a tributary of the Potaro River above the Kaieteur Fall; and previously by Appuri. This is the analogue in this genus of *Blechnum volubile*, and the habit of the two plants are alike, but they differ in their fertile portions which in this are strictly lomarioid and perish as soon as mature. In the barren condition both resemble the larger varieties (found in Guiana) of *Lygodium volubile*. This is fertile in July, August and September, but in the latter months the soriferous upper parts of the fronds are found withered and dropping away. The pinnules of these are longer than the barren ones and mere rachises with the unbroken sori along the sides. Occasionally a pinnule is found as narrow, but sterile and consequently permanent. Brazil—where it was first discovered by Spruce.

NOTE.—In the Editors Jamaica collection appears specimens of *L. semicordata*, Baker, which agree in full with the description given in Syn. Fil. p. 182.





GENUS XXI.—*Blechnum*, Linn.

SORI, subcostal, linear (or oblong), inserted on a special filiform *receptacle* forming a transverse union of the veins, parallel with the costa and margin, but distant generally from the latter; *Involucres* special, attached exteriorly inflexed, free and opening along the inner edge; *Veins* free (or rarely) united outside the *sori*. *Fronde*s not dimorphous, entire pinnate or bipinnate.

This is a small *genus* containing a score or so of species, generally of relatively small size, chiefly tropical in their range, the greater part being American. The *genus* differs from *Lomaria* and *Plagiogyria* by the fertile fronds being contracted, the lines of sori being in consequence more or less distant from the margins. The species abound greatly in individuals, and the majority spread rapidly by means of long stoloniferous shoots which they throw out around them from the rootstock, as well as by the ordinary generative course. At maturity the involucres are thrown back revealing the double row of ruddy sori, along the costæ: and the fertile fronds are as permanent as the sterile. One species has a long twining stem. In the West Indies they are spread from the lowest to almost the highest altitudes, but in Guiana they are only alpine.

Fronde simple, or with 1-2 pair of short lateral pinnae.

1. *B. lanceola*.—Swartz.

Fronde pinnatifid on the upper part, pinnate in the lower. Lower pinnae adnate and reduced to small deltoid or curved segments.

2. *B. asplenioides*.

3. *B. unilaterale*.

Lower pinnae free, and little reduced, if at all.

4. *B. occidentale*.

5. *B. longifolium*.

Fronde fully pinnate to the top; pinnae reticulated at the base.

6. *B. serrulatum*.

Fronde bipinnate twining.

7. *B. volubile*.

1. *B. lanceola*, Swartz.—Rootstock small shortly elongated, erect or decumbent, scaly; *stipites* tufted, slender, 3-5 in. l., deciduously scaly, dark-brown channelled. *Fronde*s pellucid, chartaceous, naked, much paler beneath than above, simple or composed of 1-2 pair of apposite spreading lateral pinnae and a much larger terminal one, which is ligulate lanceolate, 3-5 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. w. acuminate, the base crenate, the narrowed base of the upper lateral pair adnate to the rachis, the lower pair free; *Veins* forked, close, with clavate apices. *Sori* linear, occasionally interrupted, close to the midrib on each side often falling short of both apex and base, ruddy or coffee brown. *Involucres* narrow. —Hooker Ic., p. 970. Hook. and Bak. Syn. Fil. p. 183. *B. trifoliatum*, Klf.

Trinidad; collected by R. V. Sherring, the alliance of this is with *B. longifolium*, but their fronds are often quite simple, and when most developed have only 1-2 pair of lateral pinnae which in the Trinidad plant the most developed of the forms in this particular are 1-2 inches long and only half or one-third the size of the terminal. The rootstock is not creeping as described in Syn. Fil., but the same as in the allied species. It is correctly figured in Hook. Icones, and reproduced in his "Century of Ferns," t. 70.—Panama, Brazil and Peru.

2. *Blechnum asplenoides*, Swartz.—*Stipites* densely tufted from an erect scaly rootstock, from hardly any, distinct to 2 in. l. clothed with few scattered small scales, brown or stramineous, channelled. *Fronde*s linear-lanceolate, 6-9 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. w., acuminate, sub-coriaceous, naked, paler on the under side, reduced at the base to connected deltoid or more shallow lobes, pinnatifid throughout, segments dilated at the base, very slightly connected, deeper on the upper side, the point acute, or apiculate,  $\frac{1}{3}$ rd in. l., 2 li. w.; margins entire but sub-crenulate or repand. *Rachis* prominent beneath stramineous or brown. *Veins* forked close spreading. *Sori* reaching from the mid-rib to near the top of the segment, involucre narrow, open at length.

Guiana; Schomburgh n. 1142; Appun. n. 1270-72. Humirida Mts. Somewhat resembling *B. unilaterale*, but much narrower with the lower pinnae more reduced and passing from deltoid to shallow scallop-like segments at last not more than a li. deep, all of which, except the lowest, are connected.—Panama to Brazil, New Grenada and Antioquia.

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3. *B. unilaterale*, Willd.—*Stipites* several, caespitose from an erect fibrous rootstock, slender, short,  $\frac{1}{2}$  to 3 in. l., fibrillose, scaly; *Fronde*s narrowly lanceolate, 6-10 in. l.,  $1\frac{1}{2}$ -2 in. w., gradually narrowed at both ends, the terminal acuminate pinnae entire and even, or serrulate, dwindling at the base to small broadly adnate, sub-deltoid lobes, between these parts, pinnatifid almost to the rachis; *Pinnae* numerous,  $\frac{1}{2}$ -1 in. l., 2-3 li. w., dilated and adnate, and somewhat recurrent at the base with a rounded or acute sinus between, which in the lower part of the frond is incised in the centre, the margins even; *Sori* sub-costular. linear and continuous or in oblong patches, falling short of base and apex of the pinnae. *B. poly-podioides*. Raddi, Gr. Fl., B.W.I., p. 672. Hook. & Bak., Syn. Fil., p. 184.

Jamaica; common on banks and very stony ground, in exposed places, from 500-3,000 feet altitude; Guiana, Roraima. A small freely tufted species marked from all others by the broadly adnate pinnae which dwindle to mere auricles at the base of the fronds. The sori are variable, being sometimes continuous, and in other cases in short interrupted patches. The line on the superior side falls short of the other at the interior end. The margins are cartilaginous edged and almost imperceptibly serrate. The rootstock is freely stoloniferous and clothed with pale linear-acuminate paleae.—Spread from the West Indies and Mexico to South Brazil and Peru.

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4. *B. occidentale*, Linn.—*Stipites* caespitose from an erect or oblique stoloniferous scaly rootstock, 6-12 in. l., fibrillose scaly below; *Fronde*s 6-15 in. l., 4-9 in. w., lanceolate or ovate-lanceolate, acuminate, the lower part pinnate, upper pinnatifid and passing gradually into the entire or serrulate point, sub-coriaceous, naked or slightly puberulous. *Pinnae* acuminate sub-falcate, numerous, adnate above, below free and cordate-auriculate.  $\frac{1}{2}$  to 4 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. w., the lower ones apart or distant, and the lowest one or two pairs somewhat reduced and deflexed, the cartilaginous margin finely spinulose-serrate; *Costae* or the upper surface finely spinulose-serrate like the margins. *Veins* close, forked. *Sori* extending from the base of the pinnae to near top, or falling more or less short at both ends; the

opposite *involucral valves* connivent; but at length recurved and concealed by the matured sporangia.—Hooker & Baker, Syn. Fil., p. 185. Gr. Fl., B.W.I., p. 673. (A) variety *minor*, Hk. Fronds greatly reduced 3-6 in l.,  $\frac{3}{4}$ - $1\frac{1}{2}$  in. br. otherwise similar.

Jamaica, Dominica, St. Vincent, Trinidad and B. Guiana. Most abundant on banks and open stony ground from sea level to nearly 6,000 feet altitude; the commonest species of all, and though so well marked as to be unmistakable in any state, very variable in size, number of pinnæ, shape, &c. The pinnæ on the upper side at the base are more deeply auricled than on the more rounded under side. They vary in number from one dozen to three, and from 1-6 in. long. Before maturity the fronds are a beautiful pinkish-green. It may be distinguished from the preceding by its larger size and free cordate lower pinnæ, and from the next by its more numerous pinnæ which pass imperceptibly into the entire acuminate apex. In Jamaica near the Government Cinchona plantations, and also in St. Lucia, a form with the apex faciated or forked is found. In *a* the fronds are only 3 or 4 l., one inch, less or more wide, with lower pinnæ also contiguous and stipites only 1-2 l. In all cases the pinnæ pass gradually from the free cordate state at the base, to the fully adnate state. The Guiana plant, according to Hooker Sp. Fil., Vol. III., p. 5, has longer terminal segments, and is there named *var. caudata*, *B. caudata*—Cav.—Generally distributed through West Indies and Mainland of Tropical America.

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5. *B. longifolium*, H.B.K.—*Stipites* erect or spreading from a fibrous, upright, scaly *rootstock*, which throws out numerous stolons, 6-10 in. l., with a few scattered deciduous scales at the base. *Fronds* chartaceous pale green, naked, or the rachis slightly puberulous, short, 6-10 in. l., 4-6 in. w., truncate at the base, with a long terminal pinnæ 3-4 in. long., rather over  $\frac{1}{2}$  in. w., and 5-10 pairs of shorter sub falcate lateral ones on each side, the inferior somewhat reduced and distant, with their bases narrowed and cordate and sub-auriculate on the upper side, the underside rounded, the upper ones close and connected by their expanded fully adnate bases, abruptly passing into the long terminal segments; the margins cartilaginous-edged and finely spinnulose-serrate. *Veins* fine forked, forming casual costal areolæ; *Sori* reaching to the base, the upper pinnæ shortly decurrent against the rachis, which is slightly puberulous. Hook. Sp. Fil. Vol. III., t. 154. Gr. Fl., B.W.I., p. 673. A var. *B. Gracilis* Klf. *Fronds* much smaller, about 6 in. l. 1-2 in. w. Pinna 4-12 to a side. Hook. Sp. Fil. Vol. III., p. 48.

Jamaica, St. Vincent, Trinidad, Guiana.—On the banks of rivers and rocky banks in forests at low and high elevations. Not so generally distributed as the last. At Ugly river, St. Mary, Jamaica, the type is plentiful. It differs from *B. occidentalis*, by its relatively longer stipes, compared with its fronds, few pinnæ, longer terminal ones, and paler colour. It is chiefly distinguished by the paucity of its pinnæ and their upright passage into the generally twice larger terminal one.—West Indian Islands—Mexico to Brazil.

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6. *B. serrulatum*, Rich.—*Rootstock* free-creeping sub-terranean, with erect branches, the acresent parts densely scaly; *Stipites* stiffly erect, in tufts of 2-3 together, 8 in. to a foot or more l., stramineous, naked or bearing a few minute deciduous scales at the base. *Fronds* stiffly erect, coriaceous pale green oblong lanceolate, 1-2 ft. l., 3-9 in. w., fully pinnate throughout with a free terminal segment like the lateral. *Pinnæ* very numerous, close and often imbricating. spread-

ing, linear or ligulate, free, and sessile and articulated at the rounded and unequal-sided base, attached transversely with rachis 2-6 in. l.,  $\frac{1}{4}$ - $\frac{3}{4}$  in w., acute pointed the margins freely serrated and cartilaginous edged, both surfaces, but mostly the under one, furnished with minute deciduous scales along the mid-rib. Veins very fine, close-forked, and parallel, spreading at a wide angle from the mid-rib, pellucid when alive, Rachis stiff, stramineous and channelled down the face, as are also the ribs. Sori forming a double central row reaching from near the base to near the apex of the pinnæ. Eaton's Ferns, N.A., pl. 19, Hook. and Baker Syn. Fil. p. 186. Gr. Fl., B.W.I. p. 673. *B. striatum*, R. Br., Hook. Sp. Fil., Vol. III, t. 159.

Jamaica.—Common in central parts of that Island, Dominica, Trinidad, Guiana. In the latter country it is very common covering thousands of acres, as thickly as grass, and in the low alluvial savannah land of the coast, its growth and decay has raised the surface several feet deep with peat. Generally the fronds are only fertile in the upper part, but sometimes are so throughout. The pinnæ eventually drop the joint at the base, leaving the naked rachises standing. The rootstock spreads freely deep under ground, throwing up at intervals erect simple or furcated and densely scaly branches. Everywhere it is gregarious, and thrives best in open fully-exposed savannahs or hillsides.—Widely diffused from Florida to S. Brazil, and from Malacca to Australia.

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7. *B. volubile*, Kaulf.—Rootstock strong, sub-terrestrial, creeping to several in. l., bent with the bases of past stipites, the growing part freely scaly. Stipites 1-2 ft. l. or more. Fronds of two kinds—the barren 1-1 $\frac{1}{2}$  ft. l. composed of 2-3 opposite narrowly-lanceolate acuminate entire lateral pinnæ and a similar terminal one; the fertile, bipinnate and twining several feet high. Pinnæ of the latter petioled from 1-3 in. distant, alternate, with 2-5 pairs of opposite pinnales and a similar terminal one, the upper ones in the frond being gradually reduced, at last quite simple. Pinnulae coriaceous glabrous, glossy, with pedicels from 1-6 in. l., rounded at the base acuminate, acute or cupidate at the apex, 6-10 in. l., 1-2 in. w., 2-3 inches apart, the margins entire and cartilaginous edged. Rachis twisted, slender, pale brown, or stramineous, puberulous. Veins spreading nearly at right angles with the mid-ribs, close, simple or forked connected with a marginal line. Sori linear continuous extending from the base, but usually more or less short of the apex, sub-costal. Involucres membranous, dark brown, at first revolute and embracing the sori, both being alternately deciduous.—Hook. Gard. Ferns t. 15. Hooker & Baker's Syn. Fil., p. 187. Gr. Fl., B.W.I., p. 673. *Salpichloa*, J. Smith.

Jamaica, Dominica, Trinidad and Guiana. Under *Lomaria volubile* it was mentioned that *B. volubile* and that plant has a similar habit, agreeing generally except in their fructification. In this *Blechnum* the rootstock creeps beneath the surface to the extent of several inches, throwing up erect fronds about  $\frac{1}{2}$  inch apart on each side as it proceeds. The barren and fertile fronds are distinct, and of different habit. The former are the first produced, and their petioles are a foot or more long. They resemble closely small fronds of *Acrostichum cervinum*. After few or several of these have been produced in a new plant, the fertile appear one after another. The fertile fronds in time form quite a mass of stems.—Guadeloupe, Venezuela, Brazil and Peru.

## GENUS XXII.—Woodwardia.

SORI oblong, contiguous to and parallel with the mid-rib in a linear series. Veins forming costal areoles in a similar series with external free or areolated branches. Involucres the same shape and size as the sori, opening interiorly. Rootstock creeping or erect. Fronds bi- or tripinnatifid, uniform or dimorphous.

This small genus comes within the Northern limit of this Flora. It differs from *Blechnum* by the sori being in short patches, instead of a continuous line, and by more compound fronds. Six species inhabitants of swamps or the low banks of streams, are described in Hooker & Baker's Synopsis *Filicum* which range from Southern Europe through Asia, part of Tropical Africa and America, from Canada and California to Mexico and Guatemala.

1. *W. virginica*, Smith.—*Rootstock* stout as a pencil or finger, wide creeping, the growing part freely clothed with appressed bright brown scales, and extending in advance of the fronds. *Stipites* scattered, adherent to the rootstock, erect, a span to 2 feet high, naked dark green. *Fronds* erect, lanceolate or oblong-lanceolate,  $1\frac{1}{2}$ - $2\frac{1}{2}$  ft. l.  $\frac{3}{4}$  to 1 foot w., somewhat reduced at the base, pinnate, coriaceous, naked, bright green. *Pinnæ* erecto-spreading, distant below, sub-distant above, all sessile, pinnatifid to within a line of the costa, rather narrowed towards the base, tapering from the middle to the acute entire point, 5-8 in. l., 8-9 li. w. *Segments* oblique oblong-deltoid, blunt, faintly serrulate and cartilaginous edged, 2-3 li. br. at the base with an acute sinus between. *Rachis* rather slender, glossy. *Veins* forming a series of narrow costal areoles both along the costae and mid-rib of the segments, the former spanning from rib to rib, the exterior branches free, curved, simple or forked, running to the margin, Sori oblong in both the areolae described, Involucres rather convex. Hooker & Baker's Syn. Fil. p. 188. Eaton's Ferns, N.A., p. 52. *Blechnum*, Linn. *Doodia*, Presl.

Bermuda; found only in Pembroke marsh. This is an inhabitant of aquatic or swampy ground, where the rootstock freely extends beneath the surface in the soft muddy soil, and are often several feet long, branching as they extend the growing part being fleshy.

*W. radicans*, Smith, found in Mexico and Guatemala as well as elsewhere, is distinguished from this by an erect or sub-erect stout rootstock on which the fronds are caespitose, much larger more ovate fronds, longer serrated segments to which the sori are confined.—Canada and United States.





TRIBE IX.—Asplenieæ.

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SORI dorsal on the veins, linear or oblong, rarely arcuate or subreniform, close and parallel, or less commonly diverging, lying at a varying angle less than right with the mid-rib, sometimes nearly parallel with it, rarely at an outright angle, generally directed to the margin with varying obliquity between these extremes, more or less falling. Short of both mid-ribs and edge, or distant from, or near to one or other; *Involucres* superior, persistent, the same shape as the sori, attached along one edge, free along the other flat or vaulted; sometimes double, with the free edges connivent or thyraceous. *Sporangia* stipitate, arched by a vertical incomplete ring, bursting transversely. *Veins* free or anastomosing. Habit very diverse.

In spite of the great variety, and in many cases extreme dissimilarity, of habit, in the members, this is a particularly well marked group in the essential characters of the form and arrangement of the sori and involucres, though in the section *Anthyrium* there is an evident leading and approach in these organs to the genus *Nephrodium* of the next group. Of West Indian plants proper it comprises only the single genus *Asplenium* (which as here understood embraces several *genera* of authors) but the genus *Scolopendrium* is also represented in Tropical America, but South of the scope of this Flora.

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GENUS XXIII.—*Asplenium*, Linn.

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SORI linear, or oblong, straight or curved, sometimes transversely subreniform, dorsal on the veins beneath, and directed more or less obliquely from the mid-rib to the margin, chiefly single, but in many cases double on the same veins; *Involucres* the same shape, flat, or tumid and vaulted, opening back to back when double, when single free on the inferior side, naked or ciliate. *Fronde*s varying from an inch to several feet high, entire or variously cut, compound or decom-pound. *Veins*, free or anastomosing. *Rootstock* repent or upright.

This is the second largest genus in the family, numbering in its widest and general diffusion alone 350 species. The majority inhabit tropical regions, or rather the elevated cool regions within the tropics; but they spread, though in dwindling numbers, from this central belt North and South in the temperate zones. One-third of the numbers known are American, and nearly one-sixth West Indian, but the Guiana species are much fewer, numbering only about one-eighteenth, of the entire number known. Some delight in the sunburnt surfaces of weathered walls, the crevices of open rocks, or unshaded banks, while on the opposite hand many affect the deep shade of damp forests, where among the disintegrated rock of ravines, the banks of streams and rivulets, with loose hold of the ground, or on decaying logs, or aloft on the branches of trees; they appear to be sustained to a great extent by the abundant atmospheric moisture. Shady banks, waysides, and like situations between those extremes have also their numerous frequenters, where all but three or four of the species hereafter described are represented. In Jamaica they have their headquarters in the middle and higher mountainous regions, though not reaching the highest altitudes, and descending decrease both in type and individuals gradually as sea level is approached.

Veins free—sp. 1—69.

(†) Sori uniformly single. *Asplenium* proper.

Sp.—1—41.

Fronds simple, entire, sp. 1—2.

1. *A. angustum*.

2. *A. serratum*.

Fronds pinnato-tripartite—sp. 3.

3. *A. pumilum*.

Fronds simply pinnate; pinnae entire serrate or inciso-serrate—sp. 4—28. (*See also A. auritum* and *A. rhizophorum*.)

Rachis very slender, wiry blackish, scarious edged, fronds 1 in. or less w. sp. 4—9.

4. *A. parvulum*.

5. *A. trichomanes*.

6. *A. monanthemum*.

7. *A. formosum*.

8. *A. Harrisii*.

9. *A. Fawcettii*.

Fronds herbaceous, grey-green, truncate, stipites from two-thirds to fully as long as the fronds, and with the rachises the same colour as the pinnae sp. 10—18. (*See sp. 43.*)

Fronds  $\frac{1}{2}$ — $1\frac{1}{2}$  in. broad; sp. 10—11.

10. *A. dentatum*.

11. *A. Jamaicense*.

Fronds over  $1\frac{1}{2}$  in. w. sp. 12—18.

12. *A. firmum*.

13. *A. cultrifolium*.

14. *A. obtusifolium*.

15. *A. salicifolium*.

16. *A. auriculatum*.

17. *A. anisophyllum*.

18. *A. hastatum*.

Rachis winged with membrane sp. 19—20.

19. *A. pteropus*.

20. *A. alatum*.

Fronds twice or more, as long as the stipites; pinnae very numerous, chartaceo-herbaceous, sp. 21—24.

21. *A. lætum*.

22. *A. marinum*.

23. *A. lunulatum*.

24. *A. harpeodes*.



Texture coriaceous and stiff, sp. 25—28. (*See* *A. caudatum*.)

- 25. *A. falcatum*;
- 26. *A. dimidiatum*.
- 27. *A. serra*.
- 28. *A. bissectum*.

Fronds bi-tri-pinnate, or rarely simply pinnate sp. 29—41. (*See lunulatum, var. strictum.*)

Texture chartaceous or sub-coriaceous sori radiant; segments more or less distinctly striated sp. 29—31.

- 29. *A. furcatum*.
- 30. *A. cuneatum*.
- 31. *A. oropouchense*. Jen. n. sp.

Fronds varying from simply pinnate to decomposed; veins pinnate in the larger segments, colour pale green, sp. 32—34.

- 32. *A. auritum*.
- 33. *A. fragrans*.
- 34. *A. scandicinum*.

Fronds decomposed; herbaceous; a single veinlet and sinus to each final segment. Sp. 35—38.

- 35. *A. myriophyllum*.
- 36. *A. montverdense*.
- 37. *A. cicutarium*.
- 38. *A. rhizophyllum*.

Rachis prolonged into a naked whip-like radicans tail sp. 39—41.

- 39. *A. Willdenovii* Jen. : n. species.

(*A. rutaceum* of *Jenman's* earlier descriptions.—*See A. Perkinsii.*)

- 40. *A. Perkinsii* Jen. n. sp.
- 41. *A. rhizophorum*.

(+) Sori linear, few or several double on the same veins—sp. 42—60.

Fronds simple entire—sp. 42.

- 42. *A. plantagineum*.

Fronds pinnate; pinnæ entire 43—48.

- 43. *A. Campbellii*.
- 44. *A. Sechlerii*.
- 45. *A. juglandifolium*.
- 46. *A. grandifolium*.
- 47. *A. flavescens*.
- 48. *A. centripetale*.

Fronds pinnate: pinnæ serrated or uniformly jagged along both margins, sp. 49.

- 49. *A. duale* Jen. n. sp.

Fronds pinnate ; uniformly lobed on both sides, sp. 50

50. *A. Shepherdii*.

Fronds bi-pinnatifid—sp. 51.

51. *A. costale*.

Fronds varying from bi-pinnatifid to tri-pinnatifid, sp. 52.

52. *A. crenulatum*.

Fronds bi-pinnate, sp. 53—54.

53. *A. Hartianum*.

54. *A. ambiguum*.

Fronds tri-pinnatifid, sp. 55.

55. *A. radicans*.

Fronds pinnate, pinnae entire or with a confluent or quite free upperside of the base, sp. 56.

56. *A. arboreum*.

Fronds bi-pinnate, sp. 57—58.

57. *A. semihastatum*.

58. *A. monticulum*.

Fronds bi-tripinnate, sp. 59.

59. *A. Fadyeni*.

Fronds tripinnate sp. 60.

60. *A. Franconis*.

(+) Sori shortly oblong ; few or several double on the same veins ; involucre vaulted, sp. 61—68.

Fronds bi-pinnatifid sp. 61.

61. *A. conchatum*.

Fronds tripinnatifid sp. 62—66.

62. *A. hians*.

63. *A. altissimum*.

64. *A. Taylorianum*.

65. *A. felix-foemina*.

66. *A. crenatum*.

Fronds multifid sp. 67—68.

67. *A. Wilsoni*.

68. *A. brunneo-viride*.

Veins uniting and forming a net work next the margin, linear and parallel within sp. 69.

69. *A. marginatum*.

1. *A. angustum*, SWARTZ.—*Stipites* about an inch long, slightly scaly tufted on a shortly elongated rootstock which is clothed with dark subulate scales. *Fronde* ensiform, 1–1½ feet long. 1–1½ inches broad, tapering upwards from below the middle of the attenuated apex, the base also gradually tapered, subcoriaceous, grass-green naked, the margins even, or rather obscurely serrulate in the outer attenuated part. *Veins* free, close, simple or forked, oblique. *Sori* straight, linear, falling short of the margin, sometimes equally of both costa and margin. *Involucres*, plain, narrow, membranous, silvery.—Hooker and Baker Syn. Fil. p. 191. *A. loriforme* Hk. Ic. Pl. t. 926. Cent. Ferns, t. 26. *A. Surinamensis* Feé.

*A.* var. *Appunianum*, BAKER.—*Fronde*s 2 ft. long, or over, 1½–2 inch. wide, or longer petioles, *veins* at a wider angle with the rachis and sori longer and more abundant.

Guiana—is frequent on the branches of trees over-hanging creeks on the Corentyn River; formerly gathered by Schomburgh, and in Surinam by Hostman easily recognised by the narrow much-tapering fronds. *Appunianum* is a larger plant which I have gathered on the Essequibo near the mouth of the Potaro (my No. 1405) and on the Icooroowa large River, also over-hanging the creek on the branches of trees; first gathered by Appun. It is marked from the type by its larger size, and more abundant and longer lines of sori, that on the superior vein—branch longer, and reaching from the rachis to within a brief space of the margin—Brazil.

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2. *A. serratum*, Linn.—*Stipites* caespitose from a short erect-fibrous rootstock several or many, very short, paleaceous at the base, triquetrous. *Fronde*s simple, oblong-lanceolate, or oblanceolate acuminate, acute or cuspidate, usually gradually reduced below, but sometimes more abruptly to the short margined stipe 1–3 or 4 ft. l., 3–6 inches w., entire, repand, crenate, or crenato—serrate margined, coriaceous or subcoriaceous, bright green and glossy above, paler and duller beneath, glabrous. *Rachis* prominently raised and keeled beneath, green, purple or blackish at the base. *Veins* free close, parallel, spreading from the rachis at a wide angle, slightly curved at the base, where the majority are once forked. *Sori* linear, 1–2 in. l., about 1 li. apart, straight extending from near the rachis ½ or ¾ rds to the margin. *Involucres* narrow, flat, pale, the edge even.—Hook., Fil. Exotic, t. 70. Eat. Ferns N., Am. Pl. 3. Hooker and Baker Syn. Fil., p. 193. Gr. Fl. B.W. Indies, p. 680.

Jamaica, St. Vincent, Trinidad and Guiana.—Frequent on the branches of trees and on rocks in mountains, woods and forests at low and moderate altitudes and along the banks of rivers. The fronds are rather variable in shape, character of the margins and size. Relying on these slight features Fée divides the species into three, *integrum*, *crenulatum*, and *serratum*. The rootstock forms a dense mass of fibres by which the plant adheres firmly to the supporting branch. From this the fronds spread obliquely—erect shuttlecock-like, over-lapping each other, the centre being vacant, as in its close ally the birds nest fern *A. Nidus*, of the eastern world. The larger Jamaica specimens are 2–4 ft. high and as wide in diameter of spread of the fronds. There, it is found principally on the over-hanging branches of trees among the lower mountains. In Guiana, where it is very widely spread over the whole of the alluvial forest region, and beyond, it is much smaller, but quite as variable in the minor characters mentioned. Young plants are very deeply serrated, the feature becoming gradually modified with age. Common from Cuba to Brazil and Peru.

3. *A. pumilum*, SWARTZ.—*Stipites* tufted from a small erect fibrous root-stock, 2—4 in. l., slender, glabrescent or ciliate, dark coloured at the base. Fronds herbaceous light green glabrescent or pubescent 1—3 in. l., and nearly as wide, subdeltoid, mostly tripartite, central division often distinct from the lateral, and usually the largest, each subentire or broadly lobed, or the central pinnatifid or fully tripartite again blunt or acute pointed. Lobes rounded, entire or incised and dentate, a central vein in each lobe or division, the branches very oblique, and once or twice forked. *Sori* linear, straight, copious, 1—5 li. l., not reaching the margin. *Involucres*, pale, ciliate—Hooker x Bk. Syn. Fil. p. 212, Gr. Fl. B.W.I. p. 683.

Jamaica, St. Vincent and Trinidad.—Frequent in the former country on half exposed banks and rocks, between 2,000—4,000 ft. altitude. A small delicate herbaceous plant, in its smallest state simply trilobed and often not one  $\frac{1}{2}$  in. in diameter. In this state the divisions are blunt and entire, but when larger they are acute or acuminate, incise—lobate and serrate; but in some cases more uniformly pinnate than partite. Specimens gathered in Guadeloupe and Venezuela are much larger than the Jamaica ones, which are those I have described. These were gathered in the upper region of the Yallahs river, at 3,000 or 4,000 ft. altitude where it is very common species. Cuba, Martinique, Guadeloupe, and Mexico to Venezuela and Columbia, and occurs also in Abyssinia.

4.—*A. parvulum*, MART. & GALE.—*Rootstock*, fasciculate densely clothed with fine black hair-like, scales; *Stipites*, tufted, 1—3 in. l. wiry, dark chestnut or blackish, scariose-edged, glossy and eventually naked; *Fronds* pinnate erecto—spreading, stiffish subcoriaceous, dark or light green, naked or glabrescent, linear-lanceolate, 3—8 in. l.  $\frac{1}{2}$ — $\frac{3}{4}$  in. w. narrowed at the base. *Pinnæ* sessile even or sub-serrulate spreading horizontally, contiguous or rather apart, oblong or ovate oblong, truncate and slightly auricled on the upperside at the base. The opposite inferior side very shortly cut away or not. 3—5 li. l.  $1\frac{1}{2}$ —2 l.b. rounded at the outer end; the lower ones reduced, subdistant, rather auricled on each side, and cordate-deltoid or rounded; often deflexed. *Rachis* very slender, but stiff polished, blackish channelled with scariose edges to the face. *Veins* pinnate, branches oblique, simple and forked; *Sori* copious, short, hardly  $\frac{1}{2}$  li. l. forming a row on each side of the mid vein, but nearer the margin. *Involucres* small, scale-like, the edge even.—Eat. Ferns N. A. pl. 36 fig. 5—6. *A. ebenum* var. *minus* Hook—sp. Fil. vol. 3 p. 139. *A. resiliens* Kze.

Jamaica; frequent on open banks and in Coffee fields at 4,000 ft. altitude Old England, and gathered by Purdie on the Manchester Hills a rather stiffer plant than *A. Trichomanes*, with which it grows and has hitherto been confounded in Jamaica.

It is distinguished by oblong, rather than oval pinnæ, attached and this especially well marks the species from the next, by the inferior base, the inner edge truncate, and auricled on the upper side, the lower ones more or less deflexed suspended on both sides and often the sori are generally so copious as to nearly conceal the entire disk when spread at maturity. In this and the two following allied species, the pinnæ are deciduous. The colour is usually a yellowish green. *A. ebenum*, Ait, which in the synopsis Filicum is also ascribed to the West Indies, has similar pinnæ but is larger, and rather different in texture. Spread from Florida southward to Mexico.

5. *A. Trichomanes*, LINN. *Rootstock* small, fasciculate, densely clothed with fine, hair-like black scales, *Stipites* tufted, erecto—spreading very slender and wiry, 1–4 in. l. scarious—margined, blackish, ultimately quite naked; *Fronde*s stiffish linear 4–8 or 10 in. l.  $\frac{1}{2}$  in. or rather over w. pinnate, rather narrowed round the base: chartaceous or subcoriaceous: dark green, usually paler beneath: glabrous or glabrescent; *Pinnæ* contiguous or more or less apart, the lower ones distant or subdistant, varying between ovate-oblong and ovate-orbicular, the inferior ones nearer the latter shape, 3–4 li. l. about 2 li. w., the base cuneate or sub-cuneate, sessile and centrally attached, outer part broadly rounded, and serrulate, as on the external edges also. *Rachis* very slender, blackish, channelled and scarious edged down the face. *Veins* pinnate, the inferior branch on the upperside forked, oblique. *Sori* very short, hardly  $\frac{1}{2}$  li. l. forming a row of 2 or more on each side of the mid-vein, to which they are nearer than to the margin. *Involucres* small, scale-like; Eat. Ferns N. Am. pl. 36. Hooker & Baker, Syn. Fil. p. 196.—Hook. Brit. Fern. t. 29. Gr. Fl. B. W. I. p. 683.

(a.) *A. castaneum*, Cham. and Schl. fronds 1–1 $\frac{1}{2}$  ft. l.  $\frac{1}{2}$ – $\frac{3}{8}$  in. w. *Stipites* 1–3 in. l.; *Rachis* very strong and stiff; *pinnæ*  $\frac{1}{4}$  in. l. 2 li. w. oblong, blunt, lowest subdeltoid.

Jamaica; abundant at 4,000,—6,000 ft. altitude, and rather higher, growing on open banks, and rocks, in caves and in coffee fields. Bermudas, generally diffused, this has a laxer habit than the preceding, and the rachises are rather more fragile. It is best distinguished by the more ovate, distinctly serrate, pinnæ, cuneate at the base and centrally attached; and consequently more decidedly equilateral, the fronds are narrower and usually longer. The pinnæ are generally as broad at the outer part as at the inner; the lower ones become gradually nearly orbicular, or orbicular-flabellate. The texture though stiff is fragile. This is the typical British Maidenhair Spleenwort.

a. Is a much larger plant, with a strong stiff rachis, of which there is a sheet at Kew from Jamaica but with no locality marked. Generally distributed through the temperate and tropical regions of the globe.

6. *A. monanthemum*, LINN.—*Rootstock* short, fibrous, oblique, or erect, the apex clothed with dark minute hair-like scales; *Stipites* very densely tufted, wiry, scarious-margined, naked, dark chesnut-brown, or blackish, more or less flexuose, 3–6 in. l. *Fronde*s linear-lanceolate  $\frac{1}{2}$ –1 ft. l. or more,  $\frac{3}{4}$ –1 in. b. pinnate somewhat reduced at the base, tapering at the apex and acuminate with a serrate point; stiffish, chartaceous, glabrous slaty-green, *Pinnæ* copious spreading horizontally, close sometimes rather imbricating,  $\frac{1}{2}$  in. l. 1 $\frac{1}{2}$ –2 li. b., lower ones reduced distant and cuneato-flabellate, those above them oblong or linear-oblong, the end rounded, the upper base truncate and parallel with the margin, and slightly expanded or auricled; the under margin straight and even, much cut away the upper and outer crenate-serrate; all subdimidiate and unilaterally attached; *Veins* pinnate, the outer simple, the inner forked; *Rachis* slender wiry polished, dark chesnut brown, channelled and scarious-edged down the face. *Sori* 1–2 or 3 to a pinnæ, usually confined to the inferior side of the mid-rib, in the outer part beyond where the margin is cut away, parallel with the edge, 1–1 $\frac{1}{2}$  li. l.—Hooker and Baker, Syn. Fil. p. 197.

Jamaica; common in rather dry loose shady forest ground, and on half shady banks of a similar character at 5,000–6,000 ft. especially among the Govt.

Cinchona Plantations. A larger plant than either of the preceding, with much more numerous and closer pinnæ, of thinner texture and marked especially by the decidedly subdimidiate pinnæ, and the few sori, which are generally only one or two to a pinnæ, and invariably on the inferior side of the mid-rib. The dark green of the fronds is white with ash colour. The naked stipites, just below the base of the frond are occasionally viviparous, from which fronds as large as those of the plant itself are thrown up. These buds are peculiar in springing from the smooth surface, without the nidus of a leaflet, or anything of that character, which is the usual condition of bud production in other cases. Spread from Mexico, down the Andes to Chili, the Azores, Abyssinia, Cape Colony and Sandwich Islands.

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7. *A. formosum*, WILLD.—*Rootstock* short, fibrous, erect, *Stipites* caespitose, numerous, 1—2 in. l. slender, naked or very slightly scaly at the base, scarious margined dusk brown; *Fronds* plumose, linear-lanceolate  $\frac{1}{2}$ —1 ft. l.  $\frac{3}{4}$ —1 or  $1\frac{1}{4}$  in. w. pinnate acuminate, narrowed toward the base; elastico-herbaceous, light green, naked. *Pinnæ* very numerous, close, spreading horizontally, oblong or linear-oblong,  $\frac{1}{2}$  in. l., 2 li. w., blunt or rounded, the upper base truncate and parallel with the rachis, and rather expanded; the opposite under side cut away to  $\frac{1}{3}$ rd or  $\frac{1}{2}$  the length of the inferior margin; upper and outer margin inciso-serrate; reduced lower pinnæ more distant, inciso-flabellate in shape. *Rachis* slender, indurate, polished, dark brown or blackish channelled and scarion edged in the face; *Veins* pinnate, simple and very oblique in the outer part, flabellate in the subauricled superior base; *Sori* 2—6, usually confined to the outer half or two thirds of the pinnæ, often only 2 or 3, which are on the lower side of the mid veins. Involucre, pale, silvery, broadish as regards the length.—Hook. Fil. Ex. t. 16. Hooker and Baker Syn. Fil. p. 210. Gr. Fl. B.W.I. p. 683.

Jamaica; common among the lower hills, on wet rocks along the sides of rivers within reach of the water. It has also been ascribed to Guiana. Remarkable for its rather sub-dimidiate bright green deeply inciso-serrate elastico, herbaceous pinnæ, in conjunction with a slender wiry dark polished scarious edged rachis, like the three preceding species possess. It is an exceedingly pretty little plant, the fronds curving outwards gracefully: all round, forming a beautiful uniform plume. The texture is very thin and elastic so that the pinnæ shrivel in drying; the marginal teeth are deep and sharp. From the West Indies to Brazil, and occurring also in Trop.-Africa, Ceylon and India.

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8. *A. Harrisii*, Jenm.—*Rootstock* little larger than a pin's head densely clothed with minute dark scales; *Stipites* tufted, thread-like, dark glossy brown, 1 to  $1\frac{1}{2}$  inch long, often flexuose, channelled; *Fronds* pinnate, semi erect or prostrate, 3 to 5 inches long,  $\frac{1}{3}$  to  $\frac{1}{2}$  inch wide; *Rachis* very slender, glossy, brown, channelled, slightly margined in the upper part, and extending its thread-like, naked tail 1 to  $1\frac{1}{2}$  inch, gemmiferous, and rooting at the end, *Pinnæ* bright, glossy, translucent membranous, naked, apart, spreading, both the upper and lower gradually reduced, 2 to 3 lines long, rounded and crenate in the upper and outer part, the base truncate, dimidiate from the inferior side being cut away, the minute upper ones cuneate; *Veins* fine, forked, flabellate, open, no mid veins, terminating within the margin; *Sori* medial oblique,  $\frac{1}{2}$  to 1 line in

length, occupying both the superior and inferior veinlets; *Involucres* silvery, flat, eventually raised.

Jamaica, Blue Mountain Peak, over 7,000 feet elevation.—(*Gard. Chron.*, Jany., 1895). This very fragile, delicately thin little species belongs to the *A. viride* group, from all which, however, it is characterised by several distinguishing features, but chiefly by its attenuation upwards into the naked thread-like tail, proliferous at the end, a feature which not only marks it from its Jamaican allies of the *A. Trichomanes* group, but also from the nearer Andean allies. The buds at the end of the tail form new plants, the tip of the fronds of which are again rhizophorous, and so go on making new plants and forming more or less matted patches, as in *A. rhizophorum*. Gathered by Harris, 1894.

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9. *A. Fawcettii*, Jenm.—*Rootstocks* clustered, very small, fibrous, the centre densely clothed with fine, attenuated castaneous scales, *Stipites* in tufts, semi erect, slender, wiry but fragile, margined, castaneous or darker.  $\frac{1}{2}$ –2 inches long, *Fronde*s spreading, linear, and much narrowed to the apex, but without a naked tail, a span to 1 foot long, 6 to 8 inches wide, narrowed at the base, thin dark green, naked, *Rachis* very slender, fragile, dark, glossy, channelled with scarious margins, *Pinnæ* very numerous, sessile dwindling mostly to mere pindots in the outer part of the fronds, and reduced to auricles at the base, rhombidal and subdimidiate, the superior base wide, but hardly auricled, the inferior base absent 4 to 5 lines long, 2 lines wide, spreading contiguous, but not touching, broadly rounded and conspicuously bluntly toothed along the upper and round the outer and inferior margins to where the base is cut away; *Veins* pinnate at an acute angle, falling short in the teeth, three to a side, all simple, but the inferior one on the superior base, which is once forked from below the middle, *Sori* on both sides of the mid-vein, two or three to a side, lateral on the veins, about one line long distant from the margin, and usually short of the base, *involucres* conspicuous bright, silvery. Jamaica.

This very interesting species, and beautiful addition to the *Trichomanes* group in Jamaica, was collected by W. Harris. Its distinguishing features are the numerous *pinnæ* (three dozen to 5 dozen on a side), their dwindling to nearly, but not quite nothing at the apex of the frond, the very fragile *rachis* and the markedly (conspicuous, silver coloured) *involucres*. The *rachis* which is occasionally wavy, sometimes bears a bud in the axis of a leaflet an inch or so short of the apex. The plant is widely distinct from *A. monanthemum* L., as well as the other species of the group.

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10. *A. dentatum* LINN. *Rootstock* small, erect. *Stipites* erect 2–4 in. l. slender naked, except at the base. *Fronde*s erect 2–4 in. l.,  $\frac{1}{2}$ – $\frac{3}{4}$  in. w. naked; gray-green chartaceo-herbaceous, pinnate, linear-oblong. *Pinnæ* few 6–12 to a side, sub-opposite, more or less distant, lowest pair most remote, and little or not reduced, terminal segment blunt, lobate and inciso-dentate, the lateral  $\frac{1}{3}$ – $\frac{1}{2}$  in. l., less usually in breadth, ovate-rhomboidal, the outer part rounded and dentate, the inner cuneate, and plain-edged; *Rachis* grey-green, slightly margined. *Veins* pinnate-flabellate, forked; *Sori* copious, very oblique, linear 2–3 li. l. not quite reaching the margin. Barren fronds smaller and prostrate; *Involucres* pale very narrow;

Hook & Grew. Icon. Fil. t. 72. Eat. Fern N. Am. pl. 80. Hooker & Baker. Syn. Fil. p. 196. Gr. F. l. B. W. I. T. p. 683.

Bermudas and Bahamas, in mouths of caves. Jamaica; Common, quite through the islands at low elevations on hot and dry rocks and on walls. Well marked by its small size and the erect fertile and usually prostrate barren fronds. The pinnæ are mostly obliquely cuneate at the base, the upper side being rather deeper (sometimes expanded and subauricled) than the lower. There are two forms; the first with few, larger and more distant pinnæ, which are conspicuously dentate: the second tapering upwards; the pinnæ close and nearly twice as numerous, smaller, more ovate or ovate-oblong, the margin not dentate; the pinnæ of the barren fronds are more nearly orbicular. There are few or several fronds to a tuft. Spread from Florida to Mexico and the West Indies.

11. *A. Jamaicensis*, JENMAN.—*Rootstock* fibrous, erect, tomentose and slightly dark scaly; *Stipites* gray-green, except the base densely tufted, those of the barren fronds 1-2 in. l. of the fertile 3-6 in. naked. *Fertile fronds* central very erect, the barren external much smaller and erecto-spreading, both pinnate; the former oblong-lanceolate, 4-7 in. l.,  $1\frac{1}{4}$ -2 in. w., the base truncate, the apex narrowed and terminated in a lobate blunt or rounded segment herbaceous-chartaceous gray green glabrous. *Pinnæ*,  $\frac{1}{2}$ -1 in. l. about 2-3rds as broad spreading, approximate or apart, often rather distant about 8-10 to a side; rhomboidal-oblong, most shortly petiolate, the upper base nearly parallel with the rachis and generally expanded or subauricled, the under cut away a quarter to half the length of the inferior margin, broadly rounded in the outer part; subdentate, the auricle often forming a partial or complete lobe. *Veins*, pinnate forked, oblique, sometimes flabellate or again pinnate in the superior base; *Rachis* flattish slightly margined, green-grey; *Sori*  $1\frac{1}{2}$ -3 li. l. spreading obliquely on each side of the mid-rib not reaching the margin—(Journal of Botany).

Jamaica: Infrequent in several parts of the island, East and West, at low and high elevations. I have specimens gathered as low as 500 feet altitude and from John Crow Peak, which is about 6,000 and from several intermediate situations Mr. Sherring also gathered it in a very fine state, in St. Ann's Parish. It grows on rocks with the pinnæ short and rounded and all of them quite entire, with the habit of *a. dentatum*, and between *A. marimum* and *A. obtusatum* FORST, it is intermediate. Sometimes there is a distinctly separated segment on the upper and occasionally under side of the lower pinnæ, with pinnate veins and double series of sori as in the normal pinnæ. The flattish rachises, especially of the barren fronds, are often rather flexuose in the upper part. *A. obtusifolium* is a very much larger plant with pointed pinnæ, and a freely creeping rootstock. Guatemala.

12. *A. firmum*, KZE.—*Stipites* tufted firm, an erect or sub-erect very fibrous, small. *Rootstock* 3-5 in. l. grey-green naked; Fronds pinnate 3-6 in. l. 2-3 $\frac{1}{2}$  in. w. lanceolate or more often deltoid, lanceolate, truncate and broadest at the base, rather thin; naked, pale green or greyish; the apex 1-2 in. l., lanceolate-acuminate, lobate and inciso-serrate from the lower part. *Pinnæ* few, spreading, the lower acuminate or acute, and the upper obtuse or rounded, 1-2 in. l.,  $\frac{1}{2}$  in. w., the base unequally cuneate, or the upper side obliquely truncate and the under shortly cut away; both *margins* serrate or bi-serrate; slightly margined, sub-flexuose; *Veins* pinnate, forked,



oblique; *Sori* on the superior branch,  $1\frac{1}{2}$ -3 li., l., about equally short of both mid-rib and margin. Hook, sp. Fil. t. 174, Eat. Fer. N. Am. pl. 80. Gr. Fl. B. W. I. p. 681. *A. abscissum*, WILLD. Hooker & Baker Syn. Fil. p. 203.

Jamaica, common among the lower hills on rocks and boulders near rivers and in damp woods; plentiful in St. Mary on the banks of the Wagwater and Ugly Rivers. Very near *A. cultrifolium*, but shorter, with fewer pinnae, and more herbaceous in texture. The pinnae average 5-6 to a side, the local form described which is exactly that figured by Eaton in his Ferns of North America, and in the broader and shorter of the two fronds on Hooker's plate, has longer and more acuminate pinnae. It probably originates from buds produced on the roots, which spread freely over the surface of the supporting rock as well as from spores. West Indies, and Mexico to Brazil, and Peru.

13. *A. cultrifolium*, LINN. *Stipites* caespitose, erect, from a small upright slightly scaly rootstock, 4-10 in. l. grey-green naked, channelled; *Fronde* pinnate, lanceolate or ovate-lanceolate erect, 6-10 in. l., 3-5 in. w., chartaceous naked grey-green, truncate and broadest at the base, with a lanceolate acuminate terminal segment, lobed and inciso-serrate from the base,  $1-2\frac{1}{2}$  in. l.; *Pinnae* 2-3 in. l.  $\frac{1}{2}$  in. w.; usually subdistant, spreading oblong, lanceolate, acuminate, upperside at the base usually truncate, the under obliquely cut away very shortly; the margins serrate or bi-serrated, the teeth broad and generally evanescent in the outer point of the pinnae. *Rachis* flattish above and slightly margined; grey. *Veins* pinnate, forked; *Sori* on the outer branch, oblique linear, 2-4 li. l., more distant from the margins than midrib. *Involucre* very narrow, pale, membranous.—Hooker & Baker, Syn: Fil: p. 203. Gr. Fl. B. W. I., p. 680.

Jamaica; common on rocks near rivers and in damp woods of the lower region, and reappearing again on the Banks of streams, at 4,000-5,000 feet altitude. Trinidad; sometimes the involucre on the superior side at the base appear double, but they are not really so, being on separate veins. The marginal teeth are sub-appressed, and the inferior pinnae are frequently cuneate at the base. Casually a slight disposition is shown in the base on the upper side to expand, but though deeper than the other, it is not at all auricled. Pest—distinguished from the last species by its more numerous pinnae—6-12 to a side, and the larger size. From Old England, Jamaica, I know a specimen which may be distinct  $1\frac{1}{2}$ -2 in. high, with a deltoid terminal pinnae and 2-3 rounded lateral ones hardly a  $\frac{1}{4}$  in. broad each way with very short sori, which form was gathered also in Venezuela by Fendler. The Trinidad plant has shorter broader fronds, with the terminal portion larger, and the margins out uni-serrate. Probably generally distributed through the West Indies and from Mexico to Brazil.

14. *A. obtusifolium*. L.—*Rootstock* oblique or horizontal, repent, scaly at the end. *Stipites* approximate, erect, 6-9 in. l. grey-green, naked. *Fronde* oblong, lanceolate, pinnate, acuminate, the base truncate,  $1-1\frac{1}{2}$  ft. l.,  $\frac{1}{3}-\frac{1}{2}$  ft. w. herbaceous-chartaceous, glabrous. *Rachis* flattish, broadened at the base of the pinnae. *Pinnae* numerous, spreading 2-3 in. l.,  $\frac{1}{2}-\frac{3}{4}$  in. br. acute, or the upper ones bluntish, with a rounded or rather deltoid auricle at the upper side of the base, slightly stipitate or sessile, the under side obliquely cut away, the margin entire or rather serrulate—crenate. *Veins* pinnate, oblique, forked, that in the auricle usually again pinnate. *Sori* on the anterior branch linear, short of both margin and midrib. *Involucres*

narrow, flat. Gr. Fl. B. W. I. p. 681. Hooker & Baker, Syn. Fil. p. 202. *A. riparium*, Liebm; H. K. sp. Fil. vol. 3, t. 169.

Dominica and Trinidad, in moist forests near streams on rocks. This is easily distinguished by its repent rootstock. The auricle at the base of the pinnæ is much more pointed and abrupt than in the average form of *auriculatum*, though not of all. The name is not very appropriate, for the name was founded by Simmons on a form or condition with rounded segments. French Islands and from Mexico to Brazil and Peru.

15. *A. salicifolium*, LINN.—*Stipites* tufted from a short fibrous tomentose finely scaly-crowned rootstock, slender few, 6-10 in. l. grey-green, naked. *Fronde* pinnate, 10-18 in. l. 4-8 or 10 in. w. herbaceo-chartaceous, truncate at the base, usually more or less pendent, the terminal pinnæ free and conform to the lateral which are 4-10 to a side, spreading, distant 3-5 in. l.  $\frac{1}{2}$ -1 in. w. equilateral and cuneate at the base, and the lower ones stipitate, tapering thence to the acuminate mostly attenuated point; the margins even or slightly repond, but not toothed. *Veins* pinnate, oblique, once or twice forked short of the edge. *Rachis* flattish in the upper part slightly margined, light green, pliant. *Sori* linear on the anterior branches of the veins,  $\frac{1}{4}$ - $\frac{1}{2}$  in. l. usually equally short of both midrib and margins or more distant from the latter. *Involucres* narrow, pale, even-edged. Hooker & Baker Syn. Fil. p. 200. Gr. fl. B. W. I. p. 680. (a.) var. *A. integerimum*, Spr. *Pinnæ* relatively rather broader and shorter; substance firmer and stiffer, the margins quite even.

Trinidad, Guiana, common in forests at low altitudes and reaching in the latter country to the sandstone region; reported also to have been collected in Jamaica by Swartz, but from there I have not seen specimens. It grows on trees and logs of woods, and is more or less drooping and pendent in habit, the substance being pliant and herbaceous. In these characters and the long very oblique sori, it approaches *A. auriculatum*, but differs by the strictly and uniformly equilateral cuneate unenlarged base of the pinnæ. (A) is equally common in Guiana as the type; the difference between them being very slight. The pinnæ are 1-2 in. apart and in different plants vary considerably in breadth. —Cuba, Porto Rico and from Panama to Brazil.

16. *A. auriculatum*, SWARTZ.—*Rootstock* fibrous, erect or sub-erect, clothed with small acuminate brown reticulated scales, and tomentose. *Stipites* tufted,  $\frac{1}{2}$ -1 ft. l. channelled, glabrous, grey-green. *Fronde* pinnate 1 $\frac{1}{4}$  ft. l. 4-8 in. w. truncate at the base, terminated by an oblong lanceolate-acuminate pinnæ that is lobate below, and inciso-serrulate upwards; herbaceo-chartaceous; light green, naked; the *rachis* channelled, flattish and margined, and like coloured with the stipes. *Pinnæ* spreading nearly horizontally or often decurved petiolate, oblong-lanceolate-acuminate, more or less apart or subdistant, 2-4 in. l.,  $\frac{1}{2}$ -1 in. w., unequal sided and cordate, and expanded on the upper base, in a rounded or subdeltoid auricle, which often laps over the rachis, under opposite base, obliquely and shortly cut away. The margins biserrulate or serrulate, the teeth nearly or quite evanescent toward the point; *Veins* pinnate, once or twice forked, flabellate in the auricle; *Sori* linear, very oblique,  $\frac{1}{4}$ - $\frac{1}{2}$  in. l.; much short of the margins; *involucres*, narrow, flat, even-edged. Hook. sp. Fil. Vol. 3, t. 171. Hooker & Baker, Syl. Fil. p. 203. *A. cultrifolium* var *auriculatum*, Gr. Fl. B. W. I., p. 680.

Jamaica, Grenada, Trinidad, Dominica, St. Vincent and Guiana. Frequent in forests below 2,000 feet altitude, growing on trees and rocks. In some states the characteristic auricle at the base of the pinnæ is not much developed, in

others again it is abnormally large and as deep as the diameter of the pinnæ just beyond it. In the smaller plants it is rounded, but in the large it gradually becomes deltoid, and the part overlapping the rachis being also pointed. The habit is rather less drooping and lax, than in *salicifolium*, but they agree exactly in the character of their respective rootstocks.

In some cases the pinnæ are curved. Generally the sori do not reach to the auricle; occasionally however it does and is pinnatifid as in the ordinary pinnæ. Where the auricle is not much developed there is considerable resemblance in the dried fronds to the smaller states of *A. falcatum*, but that is a stiff coriaceous species, and this a weakly herbaceous one.—Cuba and Guadeloupe, and from Mexico to Brazil and Peru.

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17. *A. anisophyllum*, KUNZE.—*Stipites*  $\frac{1}{2}$ –1 ft. l. the base at first scaly. *Fronds* more or less pendent, pinnate chartaceous, glabrous, cloudy-green,  $1\frac{3}{4}$ –2 ft. l. 5–8 in. w., the rachis naked and grey like the stipe. *Pinnæ* alternate more or less spreading, the lower ones which are distant, not, or little reduced, shortly petiolate, upper ones subdistant the topmost sessile, with a like-formed terminal one, to the frond, 3–5 in. l.,  $\frac{3}{4}$  nearly in. w., the margins bluntly serrulated, terminating in an acuminate or alternate distantly toothed point, the subcuneate, inequilateral being deeper on the upper side, and shortly cut away on the under. *Veins* oblique, 1–2 forked terminating within the marginal teeth. *Sori* 2–3 li. l., confined to the base of the anterior veinlet but not reaching the midrib. *Involucre* ample, but elevated at last, revealing the tumid sori. Hook. Sp. Fil. p. III t. 166; a variety. Hooker & Baker Syn. Fil. p. 204.

This may readily be distinguished from its allies, by the short tumid sori, which is confined to the basal third of the vein but does not reach the base. It has the substance and nature of *A. salicifolium* and *A. auriculatum*. Besides the character of the sori, the broader pinnæ and serrulate margins with inequilateral base, distinguishes it from the former, while the absence of the decided auricle (though the upper ones show a tendency thereto) in the pinnæ, as distinctly distinguishes it from the latter. The sori are marked on the upper side. Cuba, Linden, n. 1887, and Brazil, also Africa and Bourbon.

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18. *A. hastatum*, KLOTZSCH.—*Stipites* tufted from an erect or oblique fibrous scaly rootstock, 4–7 in. l. channelled, naked or with a few small brown scales at the very base. *Fronds* pinnate oblong-lanceolate 8–12 in. l. 2–3 $\frac{1}{2}$  in. br., truncate at the base, the apex terminated by a linear blunt, distantly inciso-lobate—segment, 1–2 in. l. *Rachis* chartaceous; naked, usually dark green compressed upwards and slightly margined. *Pinnæ* spreading horizontally 1–1 $\frac{3}{4}$  or 2 in. l.  $\frac{1}{2}$  in. w. rather less or more, uniformly apart, but not distant shortly stipitate, tapering outwards to an acuminate-bluntish point unequal sided, the base oblique and shortly cut away on the underside, the upper expanded or rather auricled and cordate; both margins bilobato-dentate, the teeth irregular, rounded and deep, about a li. w. and usually in pairs. *Veins* pinnate, forked, flabellate in the basal auricle; *Sori* on the outer branch, very oblique,  $1\frac{1}{2}$ –2 $\frac{1}{2}$  li. l. distant from the margins. Hook. sp. Fil, vol. 3, t. 172; Hooker & Baker Syn. Fil. p. 205.

Jamaica, on rocks or trees, in forests of Portland at 2,000–4,000 feet altitude. A stiffer plant than *auriculatum* to which it comes nearest; relatively narrower, with more numerous and closer pinnæ, which are well marked by the

deep rounded almost lobate marginal teeth, and by the linear distantly and obtusely lobed terminal one. All the parts are blunt, but the end of the pinnæ is sometimes attenuated and the sori are comparatively short. My Jamaica specimens are quite identical with Brazilian ones I possess. Columbia, Ecuador, and Brazil.

19. *A. pteropus*, KAULF.—*Rootstock*, short, erect, scaly; *Stipites* caespitose, 2–4 in. l. margined, naked or with a few small scales at the base, greyish. *Fronde*s pinnate spreading plume-like, 1–2 ft. l. 2–3 or 4 in. w. elongate-lanceolate, the base a little reduced, at the apex passing rather suddenly into a linear attenuated, lobate point naked, light grass green thin herbaceous. *Pinnæ* very numerous, with usually a short space between them less than their own width, acute or acuminate, horizontal or sometimes rather deflexed and recurved, 1–2 in. l. 4–5 li. w. the base shortly cut away obliquely on the under side, the opposite upper side truncate and somewhat expanded but hardly distinctly auricled; both margins conspicuously and evenly serrated, the teeth oblique and blunt  $\frac{1}{2}$  l. w.; *Rachis* weakly narrowly winged throughout greyish. *Veins*, pinnate, simple, except the interior one at the base which is 2–3 times forked; *Sori* copious, oblique, 1–1 $\frac{1}{2}$  li. l., 8–12 on either side, near the midrib and distant from the margins; *involucre*s thin, pale, the edge curved.—Hook. sp. Fil. vol. 3. t. 177. Gr. Fl. B. W. I., p. 683.

Jamaica, St. Vincent and Guiana. Very common in the former at 2,000–4,000 feet altitude on rocks and trees, on the banks of streams and other wet situations in damp forests, and in similar situations in the latter up to the sandstone regions. A much more slender plant than *alatum* with the rachis much less margined with membrane, ending at the apex in a narrow lobed segment into which the pinnæ abruptly pass. The pinnæ resemble most those of *humulatum* and *harpeodes*, but the habit of growth is different, and the fronds much more weakly. When the pinnæ are acuminate, the teeth of the margin become evanescent in the elongated point. The characters are very constant. Porto Rico, Guadeloupe, and from Ecuador and Venezuela to Brazil.

20. *A. alatum*, H. B. K.—*Rootstock* erect with strong wiry roots. *Stipites* caespitose, 4–7 in. l., broadly or narrowly green winged and compressed; *Fronde*s pinnate oblong-lanceolate, 12–16 in. l. 2–5 in. w. membrane herbaceous; glabrous, dark-green; *Pinnæ* oblong-lanceolate, very numerous, apart or sub-stant, spreading nearly horizontally, 1 $\frac{1}{4}$ –2 $\frac{1}{2}$  in. l.  $\frac{3}{8}$ ths in. w. equalsided sessile, bare cuneate—rounded, the point bluntish; the margins superficially duplicato-serrate, the teeth appressed. *Rachis* compressed broadly winged throughout, elongated an inch beyond the pinnæ and rooting at the apex; *Veins* pinnate, forked; *Sori* oblique, 2–4 li. l. near the midrib but much short of the margin. Hook. & Grev. Icon. Fil. t. 137. Hooker & Baker, Syn. Fil. p. 200. Gr. Fl. B. W. I., p. 681.

Jamaica; abundant on wet rocks and banks of rivers and in beds of streams in forests at 4,600–5,000 feet altitude. St. Vincent gathered by G. S. Parker. Distinguished by its broadly winged rachis, projecting and caudate at the top of the frond, curved over gracefully to the ground and radiant, and the very numerous equalsided blunt but hardly rounded pinnæ. The colour is a very dark dull green, and the habit rather weakly, the fronds curving with the caudate end of the rachis radiant. The pinnæ generally terminate abruptly at the top of the frond and the basal ones are not, or hardly reduced. Columbia, Venezuela and Brazil.

21. *A. lætum*, SWARTZ.—*Rootstock* shortly repent, oblique, dark, fibrillose; *Stipites* tufted, few or many, slender, 2–6 in. l., light or dark brown, channelled naked. *Fronde*s pinnate oblong-lanceolate, 6–10 in. l.,  $1\frac{1}{2}$ – $2\frac{1}{2}$  in. w., the base usually truncate, the apex acuminate and lobate or serrate, chartaceo—herbaceous; naked cloudy-green; *Rachis* slender green or dark brown, rather compressed and margined above. *Pinnæ* numerous, spreading, subdimidiate, the inferior slightly stipitate and the superior slightly adnate-decurrent,  $1-1\frac{1}{2}$  in. l., 3–5 li. br., usually close, rounded blunt or acute, the underside cut away from the base in a straight or curved line, from which the outer part is up-curved, the upper base truncate deep, but not auricled or lobed; the upper and outer margins serrulate, or duplicato-serrulate, the blunt teeth  $\frac{1}{2}$  li. w. *Veins* pinnate, very oblique, simple and forked; *Sori*  $1\frac{1}{2}$ –3 li. l. very slender; involucre pale, narrow. Hook. sp. Fil. Vol. 3, t. 173. Hooker & Baker, Syn. Fil. p. 210. Gr. Fl. B. W. I., p. 681.

Jamaica, Dominica, St. Vincent, Trinidad, and Guiana. Common on wet rocks in forests and on the banks of shaded streams up to 4,000 ft. altitude. Easily recognised by the subdimidiate pinnæ, which are very deep on the upper side, quite cut away within on the under, beyond which the membrane below the mid-vein is very narrow. In Jamaica there are two forms: that at the lower elevations has fewer fronds, rarely more than 1–2 full grown with blunter pinnæ, the texture rather thicker and more of the veins forked, than the other, in which the fronds are numerous, and the rachis stiffer and dark brown. The sori are mid-way between the mid-vein and margin, but through the obliquity of the veins appears nearer the former. The Trinidad form is the largest I have seen, the fronds being 3 in. wide. The Eastern representative of this species, *A. resectum*, Smith, seems to me quite identical; from Mexico to Brazil, Cuba, Guadeloupe.

22. *A. marinum*, LINN.—*Rootstock* spreading into a tuft of crowns which are densely clothed with small linear-acuminate reticulate dark-coloured scales. *Stipites* tufted, 2–5 in. l. naked rather glossy, very dark brown; *Fronde*s pinnate 6–12 in. l.  $2-2\frac{1}{2}$  in. br. elongato-lanceolate, little or not, reduced at the base, the apex acuminate and lobate, or lobate-serrulate firm, chartaceous deep green above, lighter beneath; glossy, naked. *Rachis* dark brown in the lower part, green, compressed and margined in the upper; *Pinnæ* very numerous, spreading, oblong, or oblong-lanceolate, blunt or rounded,  $1-1\frac{1}{2}$  in. l.  $\frac{1}{3}-\frac{1}{2}$  in. br., the base oblique on the underside, the opposite upper side, truncate, deep, and in the lower pinnæ lobed or auricled; the margins duplicato-crenate or serrulate; *mid-rib* strong distinct *Veins* pinnate, forked, rather obscure; *Sori* on the superior branch, rather curved, 2–3 li. l. nearer the mid-rib; Involucre pale, narrow. Hooker and Baker, Syn. Fil. p. 207. Hook-Brit. Fern, t 31. Gr.; Fl. B. W. I., p. 681.

St. Vincent; and said to have been discovered by Sloane in Jamaica, on the rocky coast near Bath! the road to Bath is probably meant, for Bath is some distance inland; But Sloanes figure, mistakenly quoted by Linnæus for this species represents a poorish plant *A. auritum*, which is found at p. 56 of Sloanes dried ferns in the British Museum. Two other Jamaican species are also mistakenly quoted by Linnæus for the same species, viz.: *A. dentatum* and *A. cultrifolium*. The species has not been gathered in Jamaica by any subsequent collector; and I have myself looked for it in vain on the coast of Morant Bay on the road to Bath, so that the habitat is probably a mistake, originating with the misquotation of Linnæus. There are authentic specimens however, in the

Kew Herbarium from St. Vincent which I have seen, so that it is not improbable that it may be a Jamaican plant after all. Of local species its affinity is nearest to the larger states of *A. Jamaicense* and in texture (which is almost sub-coriaceous) and character of the rachis, it agrees best with the *Cultratum* group. The colour is particularly bright, and the veins and mid-rib (the latter being strong and developed) are immersed in the parenchyme. Found on the sea coast of Britain and other parts of Europe, the Orkneys, Canaries, and Azores, Nova Scotia and Brazil.

23. *A. lunulatum*, SWARTZ.—*Stipites* stiffly erect, from an upright fibrous root-stock, caespitose numerous, 2–5 in. l. not channelled but green margined, light or dark brown. *Fronde* pinnate erect, elongato—lanceolate, 6–15 in. l.,  $1\frac{1}{2}$ –2 in. w. lobato-serrate at the acuminate apex; membranous, naked, dark bright glossy green. *Pinnæ* very numerous, horizontal, lower ones distant and little, or not—reduced and deplexed, those above approximate or close, oblong,  $\frac{3}{4}$ –1 in. l. 3–4 li. br. blunt and rounded at the point,  $\frac{1}{3}$ – $\frac{1}{2}$  the base of the under side cut away with a curve, the opposite upper side truncate, deep, and in the lower ones rather auricled; the *margins* evenly serrulate, the inner teeth double and the outer single, all blunt. *Rachis* rather stiff, dark, subterete but green margined. *Veins* pinnate the inner ones forked. *Sori* very oblique,  $1\frac{1}{2}$ – $2\frac{1}{2}$  li. l. straight, nearer the mid vein than margins. *Involucres* narrow, pale, very thin. Hooker and Baker Syn. fil. p. 202—Gr. Fl. B. W. I. p. 681.

*A. var. A. strictum*, BRACK. *A. erectum* BORY.—*Fronde* as large, pale green. *Pinnæ* uniformly pinnate, the *segments* narrow, linear, blunt, often rather falcate,  $2\frac{1}{2}$  li. l.  $\frac{3}{4}$  li. w. with a space their own width between. *Veins* simple or forked, and single *sorus* to each, the interior *auricle* generally uncut, flabellate and deeply toothed. *A. rhizophyllum*, Hook. Grev. t. 193. *A. dubium*, Brack., *A. erectum* var. *sub-bipinnatum*, Hk. *A. erectum* var. *pinnatipartum*, Mett., (B) var. *parvulum*. Delicate, fronds 2–3 in. l.  $\frac{3}{4}$  in, br. petioles  $\frac{1}{2}$ – $1\frac{1}{2}$  in. l. pinnæ 3–8 li. l. 2 li, w., sori  $\frac{1}{2}$ –1 li. l.

Jamaica, St. Vincent, and Trinidad. Common in the former places on the banks of springs, and streams and on rocks under shade from 3,000–5,000 ft. altitude, the fronds are much longer than in *laetum*, and the pinnæ not so much cut away. Its stiffly erect habit, and uniformly blunt round-ended pinnæ distinguish from *pteropus* and *harpeodes*. The texture is very thin, and the colour a lucent dark green. The flat margin is conspicuous in the upper part of the rachis, but it is not membranous as in *pteropus* *A* at first sight seems perfectly distinct, but I have gathered fronds in all stages of the passage from one extreme to the other. This is found plentifully at from 3,000–5,000 ft. altitude in like situations. Both are common in the upper parts of the forest streams of the Port Royal range of mountains. B is a small delicate plant infrequent on the sides of rocks in the interior of Parish of Portland Jamaica. Widely spread in the tropics of both Hemispheres.

24. *A. harpeodes*, KUNZE.—*Rootstock*, stout, short, decumbent, densely clothed with fine auricular attenuated dark scales  $\frac{1}{4}$ – $\frac{1}{2}$  in. l.,  $\frac{1}{2}$  in. w. at the base. *Stipites* caespitose 2–4 in. l., stiff, sub-terete, dark-brown, naked. *Fronde* pinnate elongato-lanceolate, prostrate. Spreading membranous dark clear glossy green, naked 1– $2\frac{1}{2}$  ft. l., 2–4 in. w., the apex acuminate with a linear attenuated lobate segment, the base reduced. *Pinnæ* very numerous, horizontal, or often

decurved and attenuated, distant at the base of the frond and becoming flabellate as reduced, those above approximate or close, usually with half or quite their own width between,  $1\frac{1}{2}$ -3 in. l., 4-6 li. w., shortly cut away with a curve on the inferior side at the base, the opposite superior side parallel with the rachis and deep, the point acute or acuminate, but sometimes blunt; both margins evenly and deeply toothed; teeth blunt or rounded  $\frac{1}{2}$ - $\frac{3}{4}$  l. w. *Rachis* slender subterete, stiff and firm but fragile channelled and scarioso edged, polished dark brown or blackish. *Veins* pinnate, flabellate at the expanded base, beyond this simple. *Sori*  $1$ - $2\frac{1}{2}$  li. l., copious, oblique, near the distinct mid-rib, but distant from the margins. *Involucres* narrow, pale, straight, at length hidden by the sporangie. Hook, Sp. Fil. Vol. 3, t. 178. Gr. Fl. B. W. I., p. 681.

Jamaica, Dominica and Guiana. In the former frequent in forests at the highest elevations on ridges and peaks above 6,000 ft. altitude, in the latter on the base of Roraima cliff, 5,000 ft. altitude, Im Thurm, No. 369. Resembling *bissectum* in habit of growth, but differing in texture, marginal teeth and direction of the venation and sori. In the larger fronds some of the pinnae have the habit of extending two or three inches into a narrow attenuated deeply-toothed barren end, while others remain normal. Differs by the prostrate habit longer fronds, fragile, stiff, dark rachis, and especially the characters of the rootstock from *pteropus* and *lunulatum* with which in the Syn. Filicum it is associated. Mexico to Peru, occurring also in tropical and south temperate Africa and Australia.

25. *A. falcatum*, LAM.—*Stipites* strong, tufted, firm, a shortly elongated dark scaly *Rootstock*, 6-15 in. l. dark-coloured, slightly paleaceous at the base with small darkly reticulated scales and puberulous. *Fronds* pinnate-lanceolate or ovate-lanceolate, 10-18 in. l. 4-8 or 10 in. w., truncate at the base, at the apex passing gradually into a linear-lanceolate inciso-serrate acuminate point, coriaceous and stiff, glabrous, dark green and glossy above paler beneath. *Rachis* strong, channelled greyish or dark coloured like the stipes; *Pinnae* several or numerous, spreading obliquely, or often sub-horizontally, sub-distant, 3-6 in. l.  $\frac{1}{2}$ - $\frac{3}{4}$  in. w. acuminate or attenuate the base stipitate and obliquely cuneate, unequal-sided, and the lower ones expanded or auricled on the superior base, the *margins* serrato-entire, or more or less deeply and obliquely incised and serrate, with groups of sharp teeth which gradually become single in the attenuated outer part of the pinnae; *Veins* very oblique, obscure 2-3 times forked; *midrib* channelled on the upper surface; *Sori*, linear,  $\frac{1}{4}$ -1 in. l., at a very acute angle with the midrib from which it extends to near the margins; *Involucres* very narrow, firm, entire,—*A. erosum*, Mett, Hook. sp. Fil, vol. 3, t. 198, Hooker and Baker Syn. Fil. p. 208, Gr. Fl. B. W. I. p. 682.

Jamaica; common in steep stony forests, and on shady banks and cliffs, from among the lower hills up to 4,000 ft. altitude. A very stiff and coriaceous species, of a dark cloudy green colour, very variable in size, in the length of the pinnae and degree of serration or incision of the margins, and length of the sori in which characters it has exactly the same range as its ally *A. lucidum*. The fronds in growth droop and overlap each other. The largest form is found in lowland woods, and this quite agrees with the East Indian form. In this the pinnae are long and attenuated, the margins deeply incised or eroded, and the sori from  $\frac{1}{2}$ -1 in. l. Hooker's state above quoted very well represents this variety especially fig 2. The mountain form is much smaller, and darker, and the margins are serrato-entire. The sori form a simple series on each side of

the midrib, and are not duplicate as in *lucidum* and *dimidiatum*, and so far as I have observed they are uniformly single—that is, never diplazoid. Cuba and Hayti and East Indies. Trop. Africa, Mascarene Islands, Australia and New Zealand.

26. *A. dimidiatum*, SWARTZ.—*Rootstock* strong, erect or oblique often fascicled, very densely clothed with attenuated serrated dark reticulated small scales; *Stipites* tufted, several, erect, clothed toward the base, with similar scales to those of the rootstock, 4–8 in. l. dark coloured; *Fronde*s pinnate coriaceous, stiff, light or dark green, oblong-lanceolate, 8–14 in. l. 3–6 in. br. truncate at the base, the apex terminated in a deeply incised lobed, elongated and acuminate point. *Rachis* strong channelled, dark-coloured fibrillose with scattered dark reticulated scales, or nearly naked; *Pinnæ* glabrous, spreading, subdistant, 2–3 in l.  $\frac{3}{4}$ –1 in. w., stipitate, the base obliquely cuneate, the under side much cut-away in a straight line, the upper and outer deeply and irregularly incised, lobed and toothed, (all the incisions directed inward to the axis.) terminating generally in two major somewhat divergent linear-lanceolate acuminate dentate or incised points, the upper of which is mostly considerably the longer; *Veins* flabellate, with no distinct mid-rib. *Sori* straight, variable in length, copious, flabellate like the veins,  $\frac{1}{4}$ –1 in. or more l.; *Involucres*. firm, very narrow.—Hooker and Baker, Syn. Fil. p. 209. Gr. Fl. B. W. I. p. 682.

Jamaica and Guiana. Frequent in the former country where found on rocks near the banks of shady streams from 3,000–4,000 ft. altitude and in the latter near the Kaieteur Falls Potaro River where it was gathered by Mr. im Thurm. A very distinct plant marked by the exceptionally shaped, deeply lacerated pinnæ, which are devoid of a central rib. The fronds are occasionally ovate-lanceolate, but the general form is oblong-lanceolate. The pinnæ rarely reach a dozen to a side, and are generally only 5–9. The rachis is channelled and flattened in the upper part and in the Guiana plant is proliferous below the top, the habit is erect, not pendent as in the preceding and following allied species.—Cuba to Peru, and Guinea Coast, Trop. Africa.

27. *A. Serra* L AND F.—*Rootstock* creeping, woody, densely clothed with firm reticulated dark coloured scales. *Stipites*, strong, erect, 6–12 in. l. brown or dark coloured, naked or puberulous. *Fronde*s pinnate, coriaceous, glabrous, dark cloudy green, upper side glossy, pendent or prostrate-spreading, 1–2½ ft. l. 9–15 in. w., not reduced at the base the apex acuminate and lobate-serrate. *Pinnæ* spreading horizontally, sub-distant 4–8 in. l.  $\frac{2}{3}$ –1 in. b., very numerous, obliquely cuneate and stipitate at the base, where they are broadest but not auricled, and from whence they gradually taper outwards to the long, generally linear-acuminate, much attenuated point. The *margins* incised and lobate-serrate, the teeth grouped and becoming gradually distant and single in the outer part. *Rachis* channelled, minutely and sparsely deciduously ciliate on the upper side, dark coloured. *Veins* twice or thrice forked, long-curved. *Sori* about  $\frac{1}{2}$  in. l., forming a double interruptedly-continuous row close against the mid-rib and almost parallel with it. *Involucres* narrow, fragile.—Hooker and Baker, Syn. Fil. p. 206 Gr. Fl. B. W. I. p. 682.

Jamaica, Dominica and Guiana. Infrequent in forests from 4,000 to over 6,000 ft. altitude. In Jamaica chiefly on the higher ridges and peaks. This is a particularly fine plant, well distinguished by the parallel lines of costal sori,



which reminds one of *Blechnum*, and its large size amongst allied species. Sometimes an attempt is shown to form a second line of sori on each side, but oblique from the line of the first. The scales of the rootstock both of this and *timidiatum* are most clearly and beautifully reticulated. I have seen small fronds quite fertile only three or four inches long, with a large, often trilobed, terminal segment and 2-4 oblong lanceolate lateral ones gathered in Jamaica at lower elevations in St. George, Portland. Hooker Sp. Fil. vol. 3 p. 155 describes the Dominica plant as variety<sup>1</sup> *Imrayana*, the fronds 5 ft. stipes and rachis ebeneous, pinnæ 6-10 in. l. and nearly 2 in. w. General through the larger West India Islands and Southward to Peru, found also by Mann on the Cameroon mountains Trop. Africa.

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28. *A. bissectum*, SWARTZ.—*Rootstock* elongated, woody, sub-repent, densely clothed with small acuminate dark reticulated scales; *Stipites* close or sub-tufted, rather slender, 4-8 in. l., dark brown, dull glossy. *Fronds* pinnate, prostrate spreading or pendent, elongato-lanceolate 1-2 ft. long, 4-6 in. w. not, or hardly reduced at the base, glabrous, subcoriaceous and stiff, light bright yellowish green; *Rachis* slender, channelled, firm and stiff but fragile, dark brown and glossy, slightly ciliate at first, later glabrous. *Pinnæ* very numerous, nearly horizontal or oblique, 20-60 or more to a side, apart, the lower ones distant or sub-distant, 3-4 in. l., 4-6 li. b., more or less, obliquely cuneate and stipitate at the base, thence tapering outwards to the finely attenuated outer part, incised and lobato-serrate, the teeth sharp grouped within, gradually becoming single and distinct outward. *Veins* very oblique, forked; *Sori* about  $1\frac{1}{2}$  li. l., and a like space apart in the rows, close to and in line with the costa on each side of which they alternate. Hook. Sp. Fil. Vol. 3, t. 192. Hooker & Baker, Syn. Fil. p. 211. Gr. Fl. B. W. I., p. 682.

Jamaica, infrequent in forests above 5,000 ft. altitude, chiefly along the highest ridges, growing in peaty soil or leaf mould, or in the forks of trees; this too is a fine species, but the slender rachises, though stiff are so fragile or brittle that large fronds are rarely found unbroken. It agrees exactly in habit, shape of the pinnæ, and disposition of the sori with *serra*, but all the parts are much smaller, the sori very short and separated by its own length and the colour a complete contrast. Generally the base of the pinnæ is hardly cuneate, the upper side being sub-parallel with the rachis, the pinnæ taper to mere thread-like ends, and the margins in the inner half leave a very jagged aspect. Cuba, Ecuador, and Venezuela.

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29. *A. furcatum*, THUMB.—*Rootstock*, short, woody, erect or oblique, very densely clothed with blackish linear acuminate fine reticulated scales; *Stipites* tufted, erect, 6-9 in. l. dark coloured, at first densely tomentose ultimately nearly or quite naked, *Fronds*, oblong lanceolate acuminate, bi-tri-pinnatifid 9-15 in. l. 2-4 in. w., the base truncate, sub-coriaceous, naked or the ribs, ciliate beneath, dark green above and glossy, pale beneath; *Rachis* strong, channelled very dark, early tomentose or fibrillose, at length nearly naked. *Pinnæ* numerous, sub-distant spreading obliquely or horizontally ovate-lanceolate, acuminate or obtuse 1-3 in. l.  $\frac{1}{4}$ - $1\frac{1}{2}$  in. w. broadest at the base and stipitate, with no distinct mid-rib, but cut nearly to the centre into few sub-distant oblique segments on each side, the inner one of which on the upper side is cuneate and externally toothed or incised or sub-digitato-cuneate the opposite underside void of a corresponding one the others usually linear, oblong entire, truncate and

sharply toothed or erased at the end, the sides plain and even; *Veins* close, parallel or flabellate; *Sori* also parallel or radiant straight, linear, copious,  $\frac{1}{2}$  in. l. *Involucres* very narrow, pale. *A. præmorsum*, Swartz Hook & Grev. Icon. t. 189. Hooker & Baker Syn. p. 214. Gr. Fl. B. W. I. p. 682.

Jamaica, St. Vincent and Guiana, common on rocks and banks in open and sheltered places, between the middle and highest altitudes. The underside is striated in slightly radiating lines, and the ultimate segments (above the broader basal one) are  $1\frac{1}{2}$ -2 li. w. at both ends and  $\frac{1}{3}$ rd- $\frac{2}{3}$ rds in. l.—the pinnae on the underside at the base are cut away, so that there is no segment opposite the broad cuneate, often furcate or digitate one on the other side. The fronds when young are generally densely tomentose—fibrillose as in *dimidiatum* all the cutting is directed from the extensor toward the axis of the pinnae. Spread through nearly all the tropical countries of the Globe and beyond to Australia and Cape Colony.

30. *A. cuneatum*, LAM.—*Rootstock* erect or decumbent and shortly elongating, fibrous, densely clothed with fine linear-acuminate, dark reticulated scales. *Stipites* tufted 4-9 in. l. channelled dark greyish coloured, naked or puberulous, or slightly scaly at the base; Fronds 9-15 in. l. 3-8 in. w., lanceolate or ovate-lanceolate, acuminate truncate at the base, naked, subcoriaceous, dark green, glossy above, paler beneath; bi-tripinnate; *Pinnae* usually horizontal 2-4 in. l. 1-2 in. w., the same shape as the fronds, numerous, stipitate, approximate or subdistant, the acuminate point serrate, usually bi-pinnate at the base, or in the lower  $\frac{2}{3}$ rds. Pinnulae subdistant, subacute, blunt, or rounded, cuneate at the petiolate base; final segments 4-5 li. l. 2-3 li. w., entire or lobed, obovate or spatulate, cuneate or cuneato-stipitate, the outer edge rounded and dentate. *Rachis* like the stipes; *Costae* slender, flattish; *Veins* forked, radiating; *Sori* linear, 1-3 li. l. running up to the marginal teeth; *Involucres* very narrow, pale.—Hooker and Baker, Syn. Fil. Gr. Fl. B. W. I. p. 684.

Jamaica, St. Vincent, Grenada, Trinidad and Surinam. Frequent on trees, logs and rocks, growing in peat, or decayed wood and leaf-mould, chiefly on the trunks of "Trooly." *Manicaria-saccifera* in Guiana. In woods and forests ascending to about 2,000 ft. altitude, a much more compound plant than *furcatum* with the segments narrowed in all cases to a distinct petiole-like base, so that the name is very descriptive. It is very variable in size, and often not more than 6 in. l. by 1 in. w. The segments also vary in size, but not always in relation to the size of the fronds. As in *furcatum* the largest segment is on the superior side of the base, and the opposite under side is void of a corresponding one, and the pinnules have no distinct mid-rib above the base.—Cuba to Brazil, Asia, Seychelles, Johanna Island and Cape Colony.

31. *A. Oropuchense*, PRESTOE, MMS. n. sp.—*Stipites* slender, naked, grayish, channelled, 3-4 in. l. *Fronds* narrowly lanceolate, bi-pinnate chartaceous, glabrous, glossy but dull green,  $\frac{3}{4}$ -1 ft. l. reduced at base, tapering upwards into gradually reduced segments at the acuminate apex rachis slender gray, channelled, naked, *Pinnae*  $\frac{1}{2}$ - $\frac{3}{4}$  in. l. 3-4 l. w. rounded and bluntly toothed at the end the base inequalateral. Segments cuneate the basal one on the upper side flabellate the outer margin broadly rounded and toothed  $1\frac{1}{2}$ -2 li. l.

*Veins* forked, flabellulate in the larger segments. *Sori* 1--4 or 5 to a segment 1 li. 1. *Involucres* pale very membranous.

Trinidad, West Indies. I have had specimens of this fern for some long time, referred to me by Mr. Hart, who found it in the herbarium of the Botanic Department, under the *M. S.* name given to it by Mr. Prestoe, apparently its first discoverer, after the district or locality where it grows. Mr. Hart has lately gathered it in the same region. It belongs to the *cuneatum* group, but is well marked by the narrow slender fronds and short scariose sori and involucres.

32. *A. auritum*, SWARTZ.—*Stipites* slender, tufted from a small upright brown-scaly and fibrous *rootstock*, 4-6 in. l., grey-green, naked, or little scaly at the very base. *Fronde*s 6-10 in. l. 2-4 in. w., acuminate, the base truncate variable in texture, pale clear green naked. *Rachis* channelled flattish upwards, often rather expanded at the base of the pinnae, naked and like-colour with the stipes; *Pinnae* horizontal or oblique, opposite or alternate, sub-distant petiolate the lower ones freely so.  $1\frac{1}{2}$ - $2\frac{1}{2}$  in. l.  $\frac{1}{4}$ - $\frac{1}{3}$  in. w. oblong or linear-lanceolate, blunt or acuminate, and often attenuate, the base broadest and equally or obliquely, cuneate, with a single free enlarged ovate or lanceolate *segment* on the upper side, beyond which both *margins* are serrato-entire or inciso-lobate; the under side of the base cut away. *Veins* pinnate, the branches once or twice forked and running into the marginal serratures; *Sori* 1- $1\frac{1}{2}$  li. l. very oblique and mostly forming two rows sub-parallel with and medial between the mid-rib and margins, and the same in the basal pinnule. *Involucres* pale silvery.—Hooker and Baker, Syn. Fil. p. 208, Gr. Fl. B. W. I. p. 682.

(A.) var. *A. macilentum* Kunze; *Parts* all stronger, stiffer and thicker; *Rachis*, margined,  $1-1\frac{1}{2}$  li. b.; *pinnae* sub-entire, or lobed or pinnatifid on both sides within; *segments*, ovate very soriferous, *Sori*, more divergent from the line of the mid-rib. (B.) var. *A. rigidum*, SWARTZ--resembling the type in texture, &c., but *pinnae* pinnato-pinnatifid on both sides within. *A. bipinnatum*, Town.

(C.) var. *parvulum*, Jenman; *fronds* 2-4 or 6 in. l.  $\frac{1}{2}$ - $1\frac{1}{2}$  in. w.; *pinnae* inciso-serrate, or pinnatifid,  $\frac{1}{4}$  or  $1\frac{1}{2}$  in. l. 1-2 li. w. equal-sided and not enlarged at the cuneate base.

Jamaica, Dominica, Trinidad and Guiana. Common in woods and forests of Jamaica among the lower hills especially, and ascending to about 2,000 feet altitude, growing on trees in damp situations among Bromeliads and on decaying logs. This is a highly variable species of which I have given only the principal forms, as it is impossible to distinguish all, but among others I have specimens from Jamaica in which the pinnae are linear, simply serrate, and not at all enlarged or lobed at the equally cuneate base, others in which the base is enlarged and pinnatifid on the upper side, the rest of the margins of both sides deeply inciso-dentate, the larger of the teeth being again dentate or emarginate, and rather truncate at the end, others again fully pinnate at the base, and beyond this, deeply pinnatifid. In the latter form the superior segment at the base is again often lobed or pinnatifid, thus uniting the species obviously with *fragrans*. METTENIUS, several years ago detected this connection in the most compound of the forms of *Auritum* but they lack so far as I have observed the fragrance of that species. Other countries too, produce forms not found in Jamaica. (A) is abundant at 5,000-6,000 feet altitude, on exposed rocks in Jamaica, and was gathered in Guiana by Schomburgh. It has a much thicker and more fibrous rootstock than the type and the fronds (which are casually forked) are very thick and coriaceous, with dense sori more divergent from the

mid-veins. (*C*) is a delicate form gathered at 2,000-3,000 feet elevation in Portland parish Jamaica. The species is gregarious, and the plants spread into wide patches or masses by means of viviparous buds produced on threads or root-fibres. Cuba, and from Mexico to Brazil and Peru, occurring also in India, Bourbon, and Madagascar.

33.—*A. fragrans*. SWARTZ.—*Stipites* erect, grey-green, channelled, 3-6 in. l. naked, or scaly at the very base; tufted on a small, upright brown scaly rootstock. *Fronde* ovate-lanceolate, bi-tripinnate, 6-10 in. l. 3-5 in. w. finely acuminate, broadest at the base; chartaceous, light green, naked; *Rachis* like the stipites, but flattish in the upper part. *Pinnæ* spreading obliquely, lowest pair usually rather the largest; petiolate, 2-3½ in. l. 1-1½ or 2 in. w. *Pinnulæ* lanceolate stipitate, lobed or fully pinnate on both sides, the largest ¾-1 in. l. ¼-⅓rd in w. on the superior base of the pinnæ. Ultimate segments ovate-oblong or lanceolate 2-4 li. l. 1-2 li. w. sharply dentate round the outer part, or on both sides of the larger ones and acute, the base cuneate; *Veins* pinnate in the larger segments, once or twice forked in the smaller. *Sori* short, 1-1½ li. l. on one or both sides of the mid-vein of the segments, and sub-parallel therewith.—Hooker and Grev. Icon. Fil. t. 92. Hooker and Baker Syn. Fil. p. 216. Gr. Fil. B.W.I. Tp. 683 (*A*) var. *A. joeniculaceum*, H. B. K. *Fronde* conform, tripinnate, finely cut, the *ultimate segments* narrow, linear.—*A. delicatulum*, Pr.

Jamaica and Dominica. Frequent in forests and sheltered moist situations on logs and stones, especially near streams, from 2,000-5,000 ft. altitude, sweetly fragrant when dry. (*A*) is most common at the higher elevations, but by insensible gradations it passes into the type. Cuba, Guadeloupe, and from Mexico to Brazil and Peru.

34. *A. scandicinum*, KAULF. *Rootstock* upright, clothed with fine hair-like brown scales; *Stipites* tufted naked, light-green 6-10 in. l. *Fronde* 10-15 in. l., ovate or ovate-lanceolate, acuminate-triquadripinnate, thin herbaceous, light clear green, pellucid naked. *Pinnæ* sub-distant, lax, similar in shape to the fronds 3-5 in. l. and nearly as wide acuminate, long-petiolate. Tertiary and quadriary divisions petiolate. *Ultimate segments* cuneate-rhomboidal, incised with blunt teeth ¾-1 li. w. *Veins* forked; *Sori* short 1½ li., l., *Involucres* pale; *Rachis* and costæ rather flattened, light green, naked. *A. adiantoides*, RADDI;—Hooker & Baker, Syn. Fil. p. 217. Gr. Fl. B. W. I. T. p. 684.

Jamaica: Gathered by Dr. McFadyen, but the locality unknown. My description is taken from his specimens at Kew, the fronds are as large, and resemble in conformation those of *cuneatum* but the ultimate segments are larger, with broader teeth and the texture is thinner and flaccid and the colour pale as in *auritum* and *fragrans*. It seems to be pendent in habit and probably grows on trees or sides of rocks.—Brazil.

35. *A. myriophyllum*. Spreng.—*Stipites* erect, tufted, from an upright fibrous *rootstock*, 4-12 in. l. naked, green-margined, gray or dark when dry. *Fronde* lanceolate or ovate-lanceolate 9-18 in. l. 3-6 in. w. bi-tripinnate, acuminate, abruptly reduced at the base to small dwindling multifid cut pinnules, membrano-herbaceous; bright green naked, glossy. *Pinnæ* numerous, spreading horizontally approximate or subdistant, oblong-lanceolate, sessile 1½-4 in. l. ½-1 in. w. *Pinnulæ* close ¼-½ in. l. deeper on the outer side, broadly

obtuse-oblong and passing from pinnate through cuneato-flabellate gradually into simple linear or elliptical-oblong *segments* in the same shape as the latter, rounded at the outer end the base cuneate  $\frac{1}{2}$ - $\frac{3}{4}$  li. w., 1-2 li. l. the inferior ones united, emarginate or 3 toothed, and cuneato-subflabellate. *Rachis* green margined, overlapped by the basal pinnules. *Veins* simple in the ultimate lobes or segments; *Sori* also one to each,  $\frac{1}{2}$ -1 li. l. lateral on the medial veinlet.—Eat. Fer. N. Am. pl. 51. Gr. Fl. B. W. I. T. p. 684.

Bermuda; rare: Jamaica common at 4,000-5,000 ft. altitude, on wet rocks and banks along the course of streams in forests and woody places. Trinidad, Griesbach's description applies to this plant, but like some other authors he has united three or four species here regarded as quite distinct under it. Eaton's figure is true, but the United States form (which is that befigured) is much less developed than the Jamaican, only the basal segments of the pinnæ being compound. It is distinguished from *cicutarium* by the more deeply cut, fully pinnate, pinnules, never free final segments, which are broader and blunter, basal pinnules overlapping the rachis and lower portion of the fronds invariably reduced. *A. montverdense* and *A. rhizophyllum* however share with it some of these characters. The colour is a very deep grass-green.—United States, Cuba, and Porto Rico to Brazil.

36. *A. montverdense*, HOOK.—*Stipites* very slender, greyish naked, tufted on a small upright rootstock, 1-5 in. l. channelled, with narrow membraned margins. *Fronde* tri-pinnate, lanceolate or oblong-lanceolate, rather membranous, naked, slaty-green, 3-8 in. l, 1-2 in. b., acuminate, the base reduced. *Pinnæ* contiguous or apart, spreading horizontally, or the reduced lower ones rather deflexed, sessile oblong-lanceolate, mostly obtuse,  $\frac{1}{2}$ -1 in. l.,  $\frac{1}{4}$ - $\frac{1}{2}$  in. w. Larger pinnules pinnate, or sub-flabellate and cuneate, the outer ones lobed, or simple. Final segments simple and rather curved, or confluent, and obovate cuneate and emarginate, the former  $\frac{1}{4}$ - $\frac{1}{2}$  li. w. by 1 li. l., obtuse, a solitary veinlet running into each. *Rachis* winged like the stipe. *Sori* 2 li. l., one to each final segment or lobe, lateral on the veinlet, elliptical at maturity. *Involucre*s pale, longitudinally half elliptical. Hook. Sp. Fil. Vol. 3, p. 195. 2nd Cent. ferns, t. 41. (A) var. *Shermaniana*. *Stipites* and fronds shorter, the latter not or hardly reduced at the base, pinnules pinnato-flabellate, final segments more confluent, shorter and more ovate, not at all incurved, but the basal ones often rather recurved.

Jamaica; on the sides of rocks in woods, Manchester, and other of the Central and Western Parishes. Resembling *myriophyllum* in form of frond and cutting, but much smaller; different in colour and the final segments, rather curved or falcated when single, instead of elliptical-oblong, also laterally combined and obovate and cuneate or sub-flabellated emarginate or 3-fid, at the broad end. By spreading only on one side of the veinlet the sori appear quite lateral, but at maturity as Hooker says they sometimes press back, cover and conceal the delicate involucre, and occupy most of the disk of the segment where the fronds look like a finely cut and delicate *Gymnogramme*. (A) was found on banks at Mount Moses, St. Andrews, Parish, by the Rev. Sherman B. Wilson. It differs from the type by the smaller size, fronds truncate at the base, less divided and shorter segments, the separate ones of which are shorter and thus relatively broader. In my specimen the stipites are 1 in. l. fronds  $2\frac{1}{2}$ - $3\frac{1}{2}$  in. l. by  $1\frac{1}{2}$  in. w. Mountverde Cuba, Wright 1,029 discovered in 1859.

37. *A. cicutarium*, SWARTZ.—*Stipites* cæspitose from an upright fibrous rootstock, 4-9 in. l. gray green dark-coloured green-margined, naked. *Fronde* oblong or ovate-lanceolate, 9-14 in. l. 3-6 in. w.,

acuminate truncate and as a rule broadest at the base, bi-tripinnate membrano-herbaceous, light green and glossy naked; *Pinnæ* spreading nearly horizontally, close on the lower ones sub-distant, numerous, sessile, oblong-lanceolate, acuminate, 2--3½ in. l. ¾--1 in. w. *Pinnulæ* close, lowest pair of the inferior pinnæ reduced, broader and deeper on the exterior side, ovate-oblong 5--8 li. l. 3--4 li. br. at the base, which is obliquely cuneate, (or cuneato-stipitate) obtuse or rounded and sharply inciso-dentate throughout, and pinnatifid on the outer side of the base, the segments thus formed also sharply dentate, and flabellato-cuneate when free. *Rachis* green-margined like the stipes, and naked. *Veins* simple in the serratures; *Sori* copious less than a line long, ruddy, one to each of the ultimate segments, half elliptical—oblong. *Involucres* pale, thin, the same shape. Hooker and Baker, Syn. Fil. p. 220. Eat. Fer. N. Am. pl. 56.

Jamaica and Trinidad. Frequent on wet rocks along river courses among the lower hills. Marked from *myriophyllum montverdense*, *rhizophyllum* and *rutaceum* by the frond being invariably truncate, and generally broadest at the base, and the sharper toothed, and less deeply cut pinnules in which the sori, though one to each serrature, are chiefly on the disk, diverging from the mid-rib and extending thence into the base of the teeth. On the inferior side of the pinnules, the teeth are all simple, only one or two of the lower ones combined, and emarginate, but on the exterior side, several of the inferior ones are confluent, forming a free or nearly free dentate, flabellato-cuneate, segment; those next above this bifid, and the outer ones simple. The pinnules are close against the rachis, but do not overlap it, as in the other species. In time as the sori expand they press back, cover and conceal the involucres, and their copiousness gives that rusty-ruddy aspect to the under surface which is so beautiful and characteristic a feature of the species. Cuba, Porto Rico, and from Mexico to Peru and also ascribed to Tropical and South Africa.

38. *A. rhizophyllum*, KUNZE.—*Stipites* tufted from a small fibrous rootstock from ½-3 in. l., channelled, slender, margined, dark-green or brown. *Fronde*s, lanceolate, or oblong-lanceolate, 6-10 in. l., 2-2½ or 3 in. w. often viviparous and radicant eventually at or near the acuminate apex, gradually reduced at the base, bi-tripinnate, membranous, dark-green but rather glossy, naked. *Pinnæ* spreading horizontally close or sub-distant, mostly nearly or quite nearly sessile, the lower pinnules often overlapping the rachis, lanceolate or oblong or ovate-lanceolate, central ones 1-1½ in. l. ½-¾ in. w, the slender filiform costæ terminating in small spatulate bi-or-trilobed segments. *Pinnulæ* cuneato-stipitate, composed of several bare *ultimate segments* which are cuneate and bi-or trifold, flabellate or spatulate rounded about ½-¾ li. w. when single. *Rachis* firm slender, channelled, margined; dark-green. *Veins* simple in the ultimate lobes, with a solitary half elliptical sorus and a thinly membranous involucre each, which are about ½ li. l.—Hooker and Baker, Syn. Fil. p. 220.

(*A.*) *diminutum*, Jenman; *Fronde*s delicate and lax, prostrate, 1-2 in. l., ¼-½ in. w. rooting at the end; *pinnæ* cuneato-flabellate, or pinnate, with rounded or spatulate lobes.—Jenman's Hand list, Jamaica Ferns.

Jamaica—Frequent on rocks in sheltered places and caverns at 5,000-6,000 ft. altitude; common about the top of John Crow peak and ascribed to Dominica by Hooker. The stipitate character of the pinnulæ and in the larger fronds of the tertiary segments gives a more or less loose aspect to the cutting of the fronds, much laxer than in any of its allies and this with spatulate or flabellato-cuneate segments, rounded lobes proliferous rachis, fronds reduced

uniformly from the middle both up and down and short stipites, are the characteristic features of the plant. The buds are produced on the rachis, which is leafy to the end, and not prolonged and naked as in the following species; the figure Hook & Grev. Icones, Fil. t. 193, is *A. lunulatum* var. *strictum*. (*A.*) is from the caves of John Crow peak. It is fertile in the smallest and most delicate state, but probably passes into the type by intermediate states which are also found there. Central America to Grenada and Peru, and Sandwich Islands.

39. *A. \*Willdenovii* Jen. n. sp. *Stipites* caespitose from a small upright fibrous and brown-scaly rootstock, short, (hardly any clear of the dwindling pinnæ) polished, dark-brown *Fronde*s ovate or oblong-lanceolate, tripinnate 10-12 or more in. l. 3-4 in. w. acuminate thinly membranous, light or grass green, naked. *Rachis* stiffish, prolonged into a delicate thread-like naked green tail 2-4 in. l. radicate at the summit. *Pinnæ* spreading horizontally, quite sessile, oblong-lanceolate, delicate,  $1\frac{1}{2}$ -2 in. l.  $\frac{1}{2}$  in. or rather more w.; the slender rather flexuose, flattish green costæ generally terminating like the rachis, but not prolonged; *Pinnulæ* obliquely cuneato-stipitate, composed of 2-4 laxly spreading, acute-obtuse sub-spathulate or oblong segments, which are  $1\frac{1}{2}$ -2 li. l.  $\frac{3}{4}$  li. b, with a single veinlet in each, *Sori* also solitary, half elliptical, lateral in the middle of the segment; Hook 2nd cent. Ferns. t. 34. Hooker and Baker, Syn. Fil. p. 220.

Jamaica; frequent on rocks and banks by shady river courses, in moist districts, at 2,000-4,000 ft. altitude. This has most affinity with *rhizophyllum* in its cutting and form of the final segments, but the tail at the apex is long, slender and naked. In colour it resembles *cicutarium* and *myriophyllum*, the *Pinnulæ* reach quite to the base of the costæ all of which in the longer and greater number of the pinnæ end in a thread-like point devoid of an apical segment such as many of the shorter ones at the top and bottom of the frond possess; the texture is very delicate and relatively with the stiff darkpolished rachis the costæ are particularly slender and weak. Venezuela, New Granada, Ecuador, and Galapagos Island.

40. *Perkinsii*, JENN. N. SP.—*Rootstock* fibrous, densely clothed with finely attenuated undulated, reticulated, castaneous scales, *Stipites* tufted, channelled, glossy, castaneous, 1-2 in. l. fronds bipinnate, oblong-lanceolate,  $\frac{3}{4}$ - $1\frac{1}{4}$  ft. l. 2-4 in. w. much reduced at the base tapering at the apex into a filiferous naked thread 2-3 in. l. radicate at the end firmly membranous, naked, pellucid, dark glossy green; rachis and costæ similar to the stipites; pinnæ numerous, spreading horizontally, sessile, obtuse, pinnate 1-2 in. l.  $\frac{1}{4}$ - $\frac{1}{2}$  in. w. alternate, with their own width or more between them. *Segments* lax broadly cuneate sessile, bi or tri-lobed, but not divided beyond the third or middle,  $1\frac{1}{2}$ -2 li. l. and as w.; lobes roundly pointed,  $\frac{3}{4}$  li. w.; *Veins* simple in the lobes, not reaching the point, each bearing medially a single short tumid sorus; *Involucre*s vaulted at length.

Plentiful in damp forests, in the region of the Kaieteur Falls, Potaro River, British Guiana; collector, Mr. H. I. Perkins. A slender species, tailed at the top of the fronds, very close to *A. rutaceum* Mett., but differing by its much laxer habit, abrupt, instead of gradual, reduction of the pinnæ toward the base, and the slender, indurate but fragile, casta.

\* Equals *A. Rutaceum* of Jenman's earlier descriptions—See notes next species.

neous vascular parts. *A. rutaceum*, Mett. (*Aspidium Willd.*) was founded on Plum. Fil. t. 57, which differs from the plants since ascribed to it, in having a truncate base, and the apex terminating in an ordinary segment instead of a leafless radicant tail-like extension of the rachis. In the pinnules however, the chief character, the plants referred to it, quite correspond. Hookers' figure, plate 34, shows this character exactly, which consists in the pinnules being merely lobed at the top but not divided into free segments. This reveals that the Jamaica plant hitherto referred to *A. rutaceum* is quite another species—the final segments, being free and entire. This latter species I have described in my synopsis of the Jamaica Ferns in the *Bulletin* of the Bot. Dpt., Jamaica, and I now call it *A. Willdenovii*; Jenn.

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41. *A. rhizophorum*, LINN.—*Stipites* tufted from a short dark scaly upright rootstock, channelled erecto spreading, 4-6 in. l., indurated, dark chestnut-brown, polished. *Fronde*s firmly chartaceous, very dark green, naked, simply pinnate oblong-lanceolate truncate at the base  $2\frac{1}{2}$ - $3\frac{1}{2}$  in. w. 6-9 in. l. terminating abruptly, beyond which the rachis is prolonged into a slender radicant tail several inches long. *Pinnæ* oblong-lanceolate spreading horizontally 12-18 to a side, the lowest pair not or little reduced and deflexed, the upper ones reduced but not conspicuously smaller, the uppermost of all mostly distant, central ones  $1-1\frac{3}{4}$  in. l.  $3\frac{1}{2}$ -5 li. w. cut away on the inferior side in a straight or curved line  $\frac{1}{4}$ - $\frac{1}{2}$  the length, the opposite superior side, deep truncate and parallel with the rachis and sometime auricled, the point blunt or acute; margins laxly serrulate, the teeth evanescent toward the point or more deeply and conformly serrate or biserrate. *Rachis* slender, stiffish, channelled, terete very dark coloured like the stipites. *Veins* simple or forked. *Sori* oblique,  $1\frac{1}{2}$ - $2\frac{1}{2}$  li. l. on the outer two-thirds of the pinnæ, about equally short of both mid-rib and margins. Hook. Sp. Fil. vol. 3 t. 187, fig. A. Hooker and Baker, Syn. Fil. p. 204. Gr. Fl. B. W. I. p. 684. (*Var. A. cirrhatum* Rich.)

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(A.) var. *radicans*.—*Fronde*s, 6-12 in. l.  $2\frac{1}{2}$ - $3\frac{1}{2}$  in. b. *Pinnæ* of the upper half or two-thirds, entire, and obliquely cuneate at the base, linear-lanceolate, acute-obtuse; lower ones lanceolate, deeper on the upper side, with a single ovate free segment on the upper base or with two or more similar but smaller ones on one or both sides which are not dentate, the outer part of the pinnæ being also entire.—*A. radicans*, Sw.

(B.) var. *cystopteron*. *Fronde*s a foot or over, long, 3-4 in. w., *pinnæ* lanceolate, more acuto-pointed than acuminate, the upper ones entire, the lower serrulate-entire at the point, within this bluntly and roundly lobed on both sides, or pinnatifid, the segments ovate, rounded, narrowed at the base and decurrent, about 3 or  $3\frac{1}{2}$  li. l., and  $2-2\frac{1}{2}$  li. w., quite entire or faintly dentate, the pinnæ remote and dwindling along the tail.—Hook. Sp. Fil. Vol. 3, t. 187, (B.) *A. eryopteron* and *allocopteron*, KZE.

(C.) var. *cicutarium*. *Fronde*s and *pinnæ* about the size of (B) but the latter in the lower half of the frond uniformly and deeply pinnatifid to the acuminate serrulate outer part; *Segments* half their



own width or more apart, ovate-oblong, rounded, contracted at the base and decurrent the margin even or very faintly dentate. Hook—sp. Fil. vol. 3. t. 187. (C.) *A cicutarium*. Sw.

(D.) var. *flabellatum*. Fronds ovate-acuminate, truncate and broadest at the base, uniformly and fully bi-pinnate throughout, 12-18 in. l. 6-10 in. w.; *pinnæ* tapering gradually through dwindling *pinnulæ* into the serrate linear point which, in many of the *pinnæ*, is often proliferous by a minute bud produced at the very tip; *pinnulæ* approximate or sub-distant, ovate-lanceolate, cuneate and sub-stipitate, blunt, not broadly rounded, and only faintly dentate 4-8 li. l.  $1\frac{1}{2}$ - $2\frac{1}{2}$  li. w.; *costæ* flat and margined; tail long and naked beyond the distant dwindling *pinnæ* which resembles in form the secondary segments (*pinnulæ*.) *A flabellatum*, Kze.

(E.) var. *supersum*, JENMAN. Fronds 9--12 in. l.  $2\frac{1}{2}$ --5 in. w. varying from lanceolate to ovate-lanceolate, long tapering acuminate, gradually narrowed at the base, the *stipites* 3 or more in. l. uniformly bipinnate throughout; *pinnæ* lanceolate-acuminate,  $\frac{1}{2}$ -- $\frac{3}{4}$  in. w.  $1\frac{1}{2}$ -- $2\frac{3}{4}$  in. l., often terminating in a flattish thread-like end with a minute bud at the point; *pinnulæ* lax, sub-distant, ovate obtusely dentate or the larger dentate-lobate, cuneato-stipitate,  $2\frac{1}{2}$ --5 li. l.  $1\frac{1}{2}$ --2 li. w., passing through mere sub-distant teeth to the point described. *Sori*  $\frac{1}{2}$ --1 li. l.; tail very slender and naked; the reduced *lower pinnæ* more or less deflexed.

(F.) var. Fronds lanceolate, elongated and tapering upwards, 1-- $1\frac{1}{2}$  ft. l.,  $1\frac{1}{2}$ -- $3\frac{1}{2}$  in. w. fully bipinnate *pinnæ* contiguous or more or less apart to sub-distant; 1--2 in. l.  $\frac{1}{3}$ rd-- $\frac{2}{3}$ rds in. w.; Segments ovate-oblong, generally rather auricled on the upper side at the base rounded and dentate on the outer margins, the base mostly obliquely cuneate 3--5 li. l.  $1\frac{1}{2}$ --2 li. w.

(G.) var. *rachirhizon*. Fronds very variable in size and degree of cutting, tripinnate, generally ovate-lanceolate,  $1\frac{1}{2}$ --4 ft. l. 3-12 in. w. *pinnæ* approximate, the lowest not, or hardly reduced; *pinnulæ* close, oblong or ovate-oblong, dentate in the outer blunt or rounded part, next pinnatifid, within fully pinnate with close free segments which are 3-4 li. l. 2 li. w. all parts dentate on the rounded outer margins, the base plain and cuneate, *Stipites* and *rachis* stout in the larger states. the former 18 in. l., in the smaller slender and 3-6 in. l., tail and upper part of the *rachis* green or light-brown. Near fig. D. Hook. Sp. Fil. vol 3, t. 187 but Jamaica specimens often much larger and with broader and more rounded final segments.

Jamaica; the type frequent in the central parishes at 1,000-2,000 ft. altitude in forests, and all the other forms at generally high elevations in the Blue Mountain range Jamaica, the type and *A.* belong also to Guiana, the former at the head of the Pomeroon River near Mount Russell, the latter at Roraima where it was gathered by Schomburgh and lately by imThurn (his n. 171.) I have followed Hooker and Baker in taking the simply pinnate state with entire or only serrated *pinnæ* as the type. In this the upper *pinnæ* are little reduced, and terminate abruptly, which in all the others they dwindle gradually upwards becoming more distinct, to generally minute segments, the tail still extending beyond them naked. From the simplest state the order follows seriatum to the most compound. Some of them vary more or less in themselves, others like *suspensum* hardly at all. Generally it may be said with some slight variation in the majority perhaps, that each one presents definite and characteristic physiognomic features, though they cannot be always put in

words. The most elegant variety of all is *supersum*, very finely cut with a very lax habit. Of all the ferns in this flora this is by far the most varied and diversified species. Almost every variety has been named and some repeatedly as a species by pteridologists, so that the synonymy is very considerable. But so well marked is the species, taking it too, in its widest variation, that it is almost impossible to mistake the connection of any one of the varieties.

(A.) is intermediate between Hooker's figures B. and C., having the inner segment quite free, the others decurrently confluent, the outer part of the pinnae quite entire.

(B.) agrees with Hooker's figure B, but our pinnae are shorter and more ovate-lanceolate, but different plants vary.

(C.) is Hooker's figure C. *A* is more deeply cut than the last, the cutting running further out on the pinnae and the segments more open.

(D.) is larger than the last, but differs chiefly in having the pinnae pinnated right out to the attenuated serrate end, which has generally (in my specimens) a minute bud in the retuse tip. The larger segments are superficially dentate.

(E.) A much larger plant than (*d*), with distant or sub-distant pinnules which are generally smaller more stipitate and lobate-dentate, the slender end of the pinnae minutely proliferous as in *d*, and the base of the frond conspicuously reduced.

(F.) differs from the two preceding by the pinnae not being attenuated and budded at the end—the end being ovate or lanceolate and lobate-dentate and close pinnules which show a tendency to be auricled or lobed at the base, suggesting the beginning of their transition to the next state.

(G.) Is the largest and most compound state of all being fully tri-pinnate. It is (a Jamaica specimen) much larger than Hooker's figure D. and the secondary and tertiary segments are larger, broader and more rounded,—Cuba, Porto Rico, Guadeloupe, and from Mexico to Brazil and Peru.



42. *A. plantagineum*, LINN.—*Rootstock* short, erect, with strong wiry descending roots; *Stipites* tufted, erect, several,  $\frac{1}{2}$ –1 ft. l. channelled, grayish, naked, or fibrillose at the base. *Fronde*s oblong-lanceolate erect, 6–9 in. l.  $1\frac{1}{2}$ –2 in. w., the base cuneato-rounded, and often viviparous at the very bottom of the costæ on the upper surface, the apex acuminate and often rather cuspidate, or tapering to a fine point; *Margins* passing from entire below to serrate or sharply serrate in the upper part, the teeth sharper and deeper at the extreme apex; subcoriaceous, freely pellucid-dotted; naked, dark green above, paler beneath; *Costæ* prominent beneath superficial and channelled above. *Veins* directed at a very broad angle to the margin, forked, in groups of 5–7, parallel; *Sori* linear large and short, the former series extending from the coster on the lowest anterior veinlet, and mostly double,  $\frac{1}{2}$ –1 in. l. *Involucres* very narrow.—Hooker and Baker, Syn. Fil. p. 230. Gr. Fl. B.W.I., p. 684.

Jamaica—Frequent in mountain forests, generally in wet districts, and on stony broken ground, at 2,000–3,000 feet altitude, extending from the eastern to the central and western parishes. Casually the contiguous branches of the separate vein groups unite forming a costal mesh, a very distinct species, well marked by the entire lanceolate stiffly erect fronds, often viviparous at the base and long slender terete petioles. Variety *P. auriculatum*, Hook, found in Guadeloupe has a free elliptical auricle on each side, of the base.—Guadeloupe and Mexico to Brazil.

43. *A. Campbellei*, JENMAN.—*Rootstock*, small, erect, with descending tomentose root-fibres and a few small reticulated pale brown scales on the crown. *Stipites* tufted erect or sub-erect, dark, or greyish, 4–6 in. l., rather margined at the top. *Fronde*s, pinnate, composed of 1–2 pair of contiguous spreading lateral pinnae and a similar usually rather larger terminal one, which are oblong-lanceolate, acuminate, 3–5 in. l.,  $1-1\frac{1}{4}$  in. br., more rounded than cuneate at the constricted base and decurrent, forming a wing to the short rachis; chartaceous, pale green, naked; the margins serrulate. *Veins* oblique, once forked at the base and usually again near the margins which they do not enter; *Sori* copious, linear straight,  $\frac{1}{2}$ – $\frac{3}{4}$  in. l., just short of both costa and margins all single or few or several double. *Involucres* very narrow even-edged.—Gard. Chron., Vol. 24, p. 7.

Guiana; in forests on the banks of the Icooroowa creek Cange River, and on the Surinam side of the Corentyn River below the Cababbo River, terrestrial, but growing against, and attached to, the base of young trees, usually saplings an inch or two thick. In young plants the fronds are simple, but in all stages they are fully fertile. The double sori are not always exhibited, though in other cases a frond may possess several. But for their presence it would belong to the *cultrifolium* group. The substance is densely pellucid dotted and the colour yellowish green, Endemic. The name commemorates the late W. H. Campbell.

44. *A. Lechleri*, METT.—*Rootstock* recumbent, stipites strong, erect, dark coloured below and brown scaly  $1\frac{1}{2}$ –2 ft. l. *Fronde*s erect, coriaceous, dark green naked. Simply pinnate with a long terminal pinnae which is not free at the base. *Pinnae* 3–6 to a side, lowest as large as any, spreading or erecto-spreading distant or sub-distant, the upper ones much decurrent on the rachis, those below free, cuneate, sessile, or the lowest sub-stipilate, very acuminate at the

apex, 9-15 in. l.  $1\frac{1}{2}$ -3 in. b. the margin entire but slightly repand. *Rachis* stiff; *costæ* strong and prominent beneath. *Veins* close forked from the base the branches 2-3, spreading parallel from the *costæ* nearly at right angles. *Sori* linear, reaching from *costæ* to margins, straight occupying the superior branch of each bundle of veins; all double. *Involucres* narrow dark brown. Hooker & Baker, Syn. Fil. p. 231.

Guiana Appun n. 186. Essequibo River.—A very robust and coriaceous species, the under surface having a peculiarly ribbed appearance from the straight close lines of brown sori, reaching from the *Costæ* to the edge. *A. callipteris*, *Diplazium* Feé Fil. Cent. 1-10 f. 2, found in Cuba and Guadeloupe is nearer this with pinnae  $\frac{3}{4}$ -1 ft. l. 2-2 $\frac{1}{2}$  in. br. equal sided and rather squarely rounded at the base, with more numerous veinlets, their arrangement being decidedly pinnate, but all curved round and running parallel to the margin, 4-6 in number to each group, several of the inner ones being fertile from the base, but the sori falling short of the margin which is quite plain and nearly even except in the outer part.—Brazil & Peru.

45. *A. juglandifolium*, LAM.—*Rootstock* and stipites not seen. *Stipites* 1 ft. or more long. *Fronde* pinnate,  $1\frac{1}{2}$ -2 ft. l. and  $\frac{1}{2}$  ft. w. chartaceous, pellucid, bright green, glabrous, with a terminal pinnae and about light distant alternate spreading pinnae on each side, the inferior ones of which are petiolate to  $\frac{1}{4}$  or  $\frac{1}{2}$  in. 5-7 in. l. and  $1\frac{1}{2}$  in. br. acuminate and somewhat unevenly serrulate along both margins cuneate rounded at the base the lower rather unequal sided there, the upper rounded and broader on the superior base, highest of all a little adnate; *Veins* once forked from the base, the anterior branch usually but not constantly simple, the posterior forked invariably from above or below the middle. *Sori* linear, nearly straight, reaching from midrib to near the margin. *Involucres* flat, brown single or double. Hook. Sp. Fil. vol. 3, p. 242. Gr. Fl. B.W.I., p. 685.

Jamaica; there is a single frond of this among J. Smith's ferns in the British Museum labelled, Jamaica 1845, from which the above description is taken, I have a specimen gathered by G. Linden in Cuba n. 1896. Sloane's t 37 quoted by Hooker and Griesbach for this species is a mistake, it being a barren frond of *Acrostichum cervinum*. The species comes nearest *flavescens*, to which it bears as general resemblance but may be distinguished at once by the distinct terminal pinnae. Griesbach mentions Wilson as the collector of this species in Jamaica and Hooker pursuing the above mistake in the identification of that Author's figure of *Acrostichum cervinum* gives Sloane. Several authors have mistaken that figure for this species; so that collectors may therefore take *Acrostichum cervinum*, which is a common species, as a good representation of what this is like.—Cuba, Venezuela and Peru.

*Asplenium callophyllum*, KUNZE.—*Fronde* pinnate, 3-4 ft. l.,  $1\frac{1}{2}$ -2 ft. w., thickly chartaceous, very light green, translucent; *Pinnae* oblong, acuminate the base rounded, decurrent at the axis, forming a cuneate, slightly stipitate or sub-sessile attachment, margins lightly dentate within, with appressed serrations in the outer, 8-12 in. l., 2-2 $\frac{3}{4}$  in. w., *Veins* free, forked in fascicles of three to four branches, the anterior are fertile, but often also the posterior one; *Sori* reaching from the mid-rib two-thirds or more to the margin, leaving a broad open branch.—Guadeloupe.

This may be *A juglandifolium*, LAM, in a very large state which it very much resembles.

*In the Editor's Jamaica collection is a specimen answering well*

to above description, which Jenman some years pencilled in as *A. oligophyllum*, Klf. to description of which in *Syn. Fil.* it does not answer.

In our copy of Sloane's T. 37, is pencilled in as *A. Juglandifolium* in Cruger's handwriting, and the form of the pinnæ is identical with those in Editor's Jamaica collection.—(J. H. H.)

46. *A. grandifolium*, SWARTZ.—*Rootstock*, stout scaly, erect, *stipites* caespitose, strong erect, 1–1½ ft. l., dark coloured, fibrillose at the base; *Fronde*s pinnate, erect, 1–2 ft. or more long, 8–10 in. w., oblong lanceolate, acuminate, the base truncate, and not reduced, naked, sub-coriaceous, pellucid; dark green above pale beneath and brownish. *Pinnæ* spreading nearly horizontally, opposite or alternate, 4–6 in l., 1¼–1¾ in. w. or approximate, sessile, or the lower ones petiolate, the base equilateral rounded, or the upper ones sub-cordate gradually becoming fully adnate and passing into the lobate-entire apex of the frond; margins entire, or serrate towards the acuminate point or occasionally serrato-lobate throughout especially at the base. *Rachis*, strong stiff, dark coloured below, *Veins* forked 2–4 times spreading at a wide angle in fascicles of 4–6; *Sori* copious, linear, occupying all but the central branches, those of the inferior outer veins double, and ½–¾ in. l. *Involucres* broad, dark-brown at maturity.—Hooker and Baker, *Syn. Fil.*, p. 231. *Gr. Fl.*, B.W.I., p. 685.

Jamaica and Trinidad.—Very common in moist woods on the banks of rivers among the lower hills, ascending to 1,500 ft. altitude. A fine and beautiful plant, the under side most showy and picturesque with the copious sori and dark-brown glossy involucres on the back ground of the pale green surface. In some fronds the pinnæ are so close as to touch, even at the base, while in others they are as much as three inches apart. The degree of petiole too varies from hardly any to a quarter of an inch. In the large fronds there is a manifest tendency in the superior base of the upper pinnæ to be auricled. Like the pinnæ the acuminate apex is serrulate or entire beyond the evanescent lobes.—Cuba, Ecuador and Brazil.

47. *A. flavescens*, METT.—*Stipites*, a foot or more l. erect, with a few small deciduous scales at the darkly-coloured base, upwards naked and brown. *Fronde*s pinnate 1–2½ ft. l. 9–14 in. w. broadest or not reduced at the base, chartaceous, pellucid, dotted, dark grass green, paler beneath glabrous. *Pinnæ* spreading nearly or quite horizontally distant, the lower ones 2–4 in. apart and petioled, 4–6 in. l., 1¼–1½ in. w., the base equal sided rounded, obliquely so in the upper ones which become gradually adnate and pass into the pinnatifid-entire lanceolate-acuminate serrate apex. *Margins* serrate with shallow appressed, broad teeth, which are faint within, becoming deeper and shorter at the acuminate end where they are conspicuous. *Rachis* subterete, channelled, rather slender, brown, glabrous. *Veins* lax, spreading at a wide angle, once or twice forked above the base. *Sori* linear confined to the lowest outer branch, reaching nearly from midrib to edge or short of both. *Involucres* very narrow, membranous.

*A. juglandifolium*, HOOK, *Fl.*—*Exot.* t. 242 non *Lin.*

*A. Roemerianum*, KZE.

Jamaica ; Apparently infrequent in mountain woods at 2000, 3,000 gathered by Nock and formerly by Wilson. Differs from the last two by the pinnatifid-entire apex into which the lateral pinnae are gradually reduced ; and from the next two by fewer veinlets which are wider apart, by the sori being confined to the inferior outer branch and by the broad shallow appressed teeth of the margins. In the lower pinnae the veins are 2-3 li. apart at the base.—Cuba to Peru.

48. *A. centripetale*, BAKER.—*Rootstock* stout, erect, reaching  $1\frac{1}{2}$  ft. high eventually, scaly at the summit ; *Stipites* erect or erecto-spreading, 12-15 in. l. scaly throughout beneath, but specially so at the base, light-coloured as are also the scales ; *Fronde* pinnate  $1\frac{1}{2}$ - $3\frac{1}{2}$  ft. l. 10-15 in. w., acuminate rather reduced at the base ; *Pinnæ* numerous, oblong-lanceolate, spreading horizontally, close or approximately so, 6-10 in. l. 1-2 in. b., acuminate or acute, the base quite sessile and sub-cordate equilateral or often expanded and auricled on the lower side and overlapping the rachis, lower ones deflexed, passing gradually at the top into the lobate-entire and serrulate apex of the frond. *Margins* repand or sinuato-lobate ; *Rachis* channelled, strong, fibrillose ; *Veins* very close pinnato-fasciculate, the branches running subparallel toward the margin. *Sori* very copious, on all the lower branches, reaching half or two-thirds from the midrib to the margins, all, or nearly all, double ; involucre pale. Hooker and Baker Syn. Fil. p. 232. Gr. Fl. B. W. I. p. 685. *A. centripetale*, Baker, Sy. Fil. p. 490, 2nd ed.

Jamaica ; common in moist forests from 2,500-6,000 ft. altitude. Trinidad. The veinlets are 4-8 or 10 in a group, each one as the margin is approached shorter than the other, distinctly pinnate in the larger fronds, but sharply curved and running sub-parallel to the margin. The pinnae are in some of the states hastate at the base ; and in all truncate, if not rather expanded there ; in the smaller fronds plain, but in the larger uniformly sinuous-lobed on both sides. Usually the sori are only on the inferior veinlets, and reach only half way from the midrib to the margin, but in the largest fronds the shorter outer branches are also fertile, so that, and in consequence of the proximity of the veins, the surface is covered nearly to the edges. The scales are largest at the base of the stipites and become fibrillose as they ascend. Generally the texture is membrano-herbaceous. *A. centripetale*, BAKER, is the largest and most developed condition, in which the sori are very abundant reaching from the midrib two-thirds to the margin. In wet ravines and gullies in Jamaica forests at the elevations mentioned above, it is a beautiful and striking species. It was first gathered, and brought to England alive, by James Hirlow ; and since then all collectors have procured it.—Venezuela, New Granada, and Brazil.

49. *A. duale*, JENMAN.—*Rootstock* woody oblique or decumbent, clothed with fine dark scales. *Stipites* tufted, strong stiff, dark-coloured, channelled, naked, or with a few small scales and pubescence at the base. *Fronde* oblong-lanceolate, pinnate, chartaceo-coriaceous, dark green, glossy, beneath pale, glabrous, 8-15 in. l.,  $2\frac{3}{8}$ -5 or 6 in. w., with the base truncate, reduced upwards to the acuminate lobato-serrate apex. *Rachis* stiff, very dark, channelled subterete. *Pinnæ* spreading obliquely, petiolate, the lower ones often to  $\frac{1}{2}$  in. oblong-lanceolate, acuminate, the base unequal, cut away shortly on the underside, the upper expanded often sub-auricled or auricled, frequently obliquely cuneate.  $1\frac{1}{2}$ -3 or 4 in. l.,  $\frac{1}{3}$ -1 in. or over br., the margins conspicuously lobato-serrate and often jagged with more or less deep incisions. *Veins* once or twice forked, curved, the inferior fascicled or again pinnatifid. *Sori* linear,  $\frac{1}{4}$ - $\frac{3}{4}$  in l. in a single or semi-double series on each side the

mid-vein from which they diverge at a narrow angle, falling short of the margin; often double in the larger fronds. *Involucres* very narrow firm even. Hooker, and Baker, Syn. Fil. p. 209.

Jamaica, central parishes, gathered in St. Anne and Clarendon by Sherring. The larger fronds only have the sori as a rule diplazoid, but in these they are abundantly so. Between the larger and smaller fronds there is a good deal of variation of aspect. The former as a rule have the pinnae freely petioled and deeply incised, the lobes formed by the incisions being sharply toothed, together producing a very jagged and lobed appearance of the margins, usually in the smaller states the margins are serrated, but they are comparatively even, and the sori in a single series on each side the mid-vein. In the larger they are irregularly duplicated by being produced also on some of the exterior veinlets single and double, and often pinnatifid in the auricled base. The sori generally, when present on the outer veinlets, extend to them from the inner ones and in these cases it is furcate, and the outer series is turned the reverse way of the inner. The species has a close resemblance to *falcatum* covering exactly the same range of variation from which it is distinguished by its different sori and brighter colour.

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50. *A. Shepherdii*. SPRENG.—*Stipites* caespitose from a stout erect or oblique palaceous-crowned rootstock, 8–12 in. l. strong channelled darkcoloured at the base and deciduously scaly. *Fronds* pinnate or sub-pinnatifid, acuminate, 1–2 ft. l. 10–15 in. w., the apex pinnatifid, passing gradually into the serrate or serrulate point, naked, dark green, pellucid, membrano-chartaceous. *Pinnae* nearly or quite horizontal distant, lower petiolate, upper adnate and shortly decurrent, the lowest usually largest, 6–8 in. l. 1–1 $\frac{3}{4}$  in. w. cut on both sides one-third or half-way to the costa into broad rounded sub-crenulate lobes, which are 3–4 li. b. the interior one on the superior side of the base usually much larger than the rest, (and rarely in lowest pair of pinnae quite free) the interior ones on the lower side of the midrib reduced, the basal one smallest, with its inner margin oblique from the rachis. *Rachis* strong, channelled wood-brown. *Veins* pinnate in the lobes, simple and forked, *Sori* linear, curved, 2–5 li. l. confined to the lowest exterior veinlets, or as well occupying several of those above this, only the former double.—Hook & Bak. Syn. Fil. p. 233. Gr. Fl. B.W.I., p. 685.

Jamaica, Barbados, Dominica, St. Vincent, Trinidad and Grenada. Damp woods and forests, ascending in Jamaica where it is frequent, to 4,000 feet altitude. A much larger plant as a rule than any of the arboreum group: marked by the broad pinnae which are uniformly lobed to about the same depth throughout, those in the upper part adnate, and in the lower petiolate. Sometimes the lowest pair are reduced on both sides at the base. The colour is dark glossy green, but clear, and the texture thin. The lobes pass into serratures at the acuminate point, the majority of Jamaica specimens are fertile only on the lowest anterior veinlet, but in this they, as well as those of other countries vary, and I have some fronds with nearly all the veinlets fertile. The Guiana plant has narrowed more attenuated pinnae, with the lobes more dentate than those of the West Indian Islands. *A. striatum* LINN. is the oldest name; but its application is uncertain, and there are several synonyms.—Cuba and Mexico Guiana and Brazil.

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51. *A. costale*, SWARTZ.—*Rootstock*, very stout, erect, or oblique often 1 ft. or more high, the crown clothed with dark coloured lanceolate-scales. *Stipites* caespitose, erect, stout, palaceous, at the base 1–2 ft. channelled. *Fronds* bi-pinnatifid 2–4 ft. l., 1 $\frac{1}{2}$ –2 ft. w. ovate-lanceolate, little reduced or not, at the base, the apex pinnatifid,

passing into the serrato-acuminate point, chartaceous or sub-chartaceous, pellucid-dotted, generally dark green, paler beneath, the membranous surface naked. *Pinnæ* spreading horizontally, oblong-lanceolate, acuminate, the base truncate, the lower ones petiolate. 8-14 in. l., 2-5 in. w, pinnatifid to within  $\frac{1}{4}$ - $\frac{1}{2}$  in. of the costæ, the apex subentire and sharply serrate; *Segments* close, subfalcate acute, spinulose-serrate in the outer part, the teeth appressed and feint within  $\frac{1}{2}$ - $\frac{3}{4}$  in. b.  $1\frac{1}{2}$ - $2\frac{1}{2}$  in. l. from the base, interior one on the superior side usually a little reduced; *Rachis* strong, light or dark brown, channelled, slightly and deciduously scaly. *Costæ* stramineous or brown beneath, flattish, also slightly scaly, toward the base. *Veins* pinnate-forked, curved; *Sori* oblique linear, 3-5 li. l., on the vein extending from the mid-rib  $\frac{1}{3}$ - $\frac{1}{2}$  way to the margins, from the primary on to the anterior veinlets, usually confined to the lower half or two-thirds of the segment, only the inferior ones, if any, double. *Involucres* very narrow, the edge plain or eroded.

(Dipl.) *Apollinaris*, FEE., Fil. Ant. t. 10, fig. 1. Hooker and Baker, Syn. Fil. p. 236, Gr. Fl., B.W.I., p. 686.

(A) *Var*: *segments* pinnatifid nearly to the *rachis* at the base, deeply toothed throughout, *teeth* acute, subfalcate. *A. Desvauxii*, METT.

Jamaica; frequent in very moist forests from 2,000-6,000 ft. altitude. A large very robust, species, well marked by its leafy, simply pinnatifid, pinnæ, and stout subarboroid caudex. The scales which densely clothe the crown of the latter and the bases of the stipites are large, very dark coloured or blackish. It has no near ally in this flora, and is only known in Jamaica of all the West Indies.—New Granada, Ecuador, and Peru.

52. *A. crenulatum*, BAKER.—*Rootstock* stout, erect, often several inches high, the crown clothed with dark or blackish, lanceolate scales  $\frac{1}{2}$  in. l. *Stipites* erect, strong,  $1\frac{1}{2}$ -2 ft. l. channelled, greenish upwards, dark and clothed with scales like those of the rootstock at the base; *Fronde* bi-pinnatifid, oblong-lanceolate, acuminate  $1\frac{1}{2}$ -2 ft. l. 10-15 in w. the apex pinnatifid, not reduced at the base, membrano-chartaceous, variable in colour, pale beneath, naked or nearly so. *Pinnæ* numerous, spreading horizontally 6-9 in. l.,  $1\frac{1}{2}$ -2 in w. very shortly stipitate, oblong-lanceolate serrato-acuminate, close or sub-distant, at the base of the fronds, deeply pinnatifid to within  $1\frac{1}{2}$ - $2\frac{1}{2}$  li. of the costæ. *Pinnulæ*  $\frac{1}{2}$ - $\frac{3}{4}$  in l. from the sharp sinus, 3-4 li. b. oblong rounded, horizontal, with no open space between them; the margins slightly crenato-serrate, chiefly round the outer part of the segments. *Rachis* channelled, rather stiff brownish; *Costæ* puberulous. *Veins* simple or once forked, the lowest opposite pair excurrent just above the sinus. *Sori* copious 1-2 li. l. extending from the midrib 2-3rds. to the margins, generally only the lowest double. *Involucres* very narrow and plain. Hooker and Baker, Syn. Fil. p. 236. *A striatum* Mett. Gr. Fl. B.W.I. p. 686.

(A.) *var. grammatoïdes*; *Stipites* and *Fronde* usually taller and stronger, *pinnæ* more or less distant in the lower half, and fully pinnate at the base, with an open space between the pinnulæ which are distinctly or fully crenato-serrate along the sides or slightly lobate at the base, the point acute or bluntish. *Rachis* and *stipites* stronger. *Diplazium grammatoïdes* Fée. Fil. Cent. t. II.



(B.) var. *bi-pinnatisectum*.—*Fronde*s more ample,  $1\frac{1}{2}$ – $1\frac{3}{4}$  ft. w. pinnae 10–12 in. l. 3–4 in. w. those of the lower half more fully pinnate their greater length. *Pinnulae*, oblong-lanceolate,  $1\frac{1}{2}$ – $1\frac{3}{4}$  in. l.  $\frac{1}{2}$ – $2$ -3rds in. w. the point acute, entire below this; cut into shallow lobes 1– $1\frac{1}{2}$  li. w. and nearly as deep. *Veins* pinnate in the lobes, with much curved simple branches, the sori double in the lower ones. Gr. Fl. B.W.I. p. 686. *A. dubium*, Hook.

(C.) var. *expansum*.—*Pinnulae* 8–12 in. l.  $2\frac{1}{2}$ – $3\frac{1}{2}$  or 4 in. w. *Pinnules* spreading horizontally, with their own width more or less between  $1\frac{1}{2}$ –2 in. l.  $\frac{1}{3}$ – $\frac{1}{2}$  in. w. tapering outwards from the base, within very shallowly cut into broadly rounded lobes. *Veins* impressed on upper length green rather glossy surface. Sori very copious—*A. expansum*; WILLD.

(D.) var. *tri-pinnatifidum*. *Fronde*s ample. Larger pinnae 1 ft. l. 4 in. w. oblique. *Pinnulae* 2– $2\frac{1}{2}$  in. l.  $\frac{1}{2}$ – $\frac{3}{4}$  in. w. truncate at the base, the lower ones not quite sessile cut,  $\frac{1}{2}$  or 2-3rds towards the costae into close straight oblong lobes which are sub-angular forming rather a point at the anterior corner.

Jamaica, St. Vincent, and Trinidad, frequent in moist woods and forests, below 3,000 ft. altitude. The type is common in Jamaica on the banks of St. George's Spring, Chesterfield, St. Mary. *A* is common in the same parish in several places, *B* and *A* at "Second breakfast" Spring, St. Andrew. The type is simply bi-pinnatifid much less robust and of thin texture, with generally scunter sori than the other varieties, but there is a gradual passage from one to the other. *B* is more puberulous on the underside, and it passes into *C* and *D* which can hardly be distinguished from some of the states of *radicans*, with which it quite connects this species. From *hians*, which it also resembles, the linear character of the sori distinguishes it. *B* and *C* agree also with *A. Klotzschii*, METT, as it is represented at Kew, and with which, some of the specimens of these are associated there. *C* is rather laxer in habit, and the pinnules only very shallowly cut, compared to *A*. It was gathered by Wilson, whose frond is John Smith's fern, and I have gathered it once myself.—Cuba and French Islands, to Mexico and Brazil.

53. *A. Hartianum*, JENMAN.—*Rootstock* stout, erect, the crown clothed with lanceolate brown scales. *Stipites* caespitose, erect 10–15 in. l., channelled, brown, puberulous, the dark base clothed with deciduous scales like those of the rootstock. *Fronde*s bi-pinnate, oblong-lanceolate, acuminate, with a pinnatifid serrate apex, broadest, or not reduced at the base,  $1\frac{1}{2}$ –2 ft. l., 1 ft. wide, herbaceo-characeous dark clear green above, paler beneath, upper side naked, under glandulose-pubescent, the vestiture rust coloured at maturity. *Rachis* channelled, brown deciduously sub-pubescent and puberulous. *Pinnae* horizontal very lax throughout, the upper ones apart and sessile becoming gradually more distant and increasingly stipitate or petiolate to the base. A span long,  $1\frac{1}{2}$  in. w. oblong-lanceolate, the outer part pinnatifid and serrato-acuminate, the inner half or more pinnate. *Pinnules* horizontal apart or sub-distant oblong, rounded  $\frac{1}{2}$ – $\frac{3}{4}$  in. l.,  $\frac{1}{4}$ – $\frac{3}{8}$  in. w., the interior ones of the lower pinnae reduced, and the lowest ones on the inferior side of the lowest pair of all absent; free and rounded at the base, becoming gradually adnate to the costae, and closer as the pinnatifid outer part of the pinnae is approached; *Margins* freely crenato-dentate, the teeth 1–2 l. w. *Costae* slender, glandulose, pubescent, margined in the outer part, cartilaginous edged within. *Veins* forked, pinnate and the

branches open. *Sori*, reaching half-way to the margin from the mid-rib, extending from the primary vein to the anterior veinlet, few or several double.—*Involucres* membranaceous.—*Jour. Botany*.

Jamaica—Infrequent in forests of the middle or higher elevations a much laxer plant than the preceding, with little more than half or two-thirds the number of pinnae and pinnulae, both of which become gradually more distinct towards the base; marked as well by the deep teeth, (almost lobules) of the margins, and viscid rusty pubescence of the under surface, different colour, and more abundant double sori. The pinnae of the lower part of the fronds are invariably narrowed at the base, and the lowest of all are petiolate a  $\frac{1}{4}$ – $\frac{1}{2}$  an inch. Possibly it grows to a larger size, for I have only seen the single frond, which is however complete in all its parts, and quite mature that is in my collection. Linden's No. 1,745 of Cuba is very near this and only differs by its less vestiture and narrower and longer final segments.

*Collected at the base of Grants Peak, at a corner of road on the Bellevue Cinchona field, in a dark ravine. It grows to nearly double the size of specimen described, and blackens in drying.*—(ED.)

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54. *A. ambiguum*, RADDI.—(This species is included by Baker under the next species—*A. radicans*, SCHK. Jenman had included it in his list as number (54) but the description does not appear to have been written. In the absence of specimens it is doubtful what the late Mr. Jenman intended, although he gave name and number.—ED.)

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55. *A. radicans*, SCHK.—*Rootstock* very stout, erect 6–18 in. high; *Stipites* erect 2–3 ft. l. channelled, dark coloured, clothed at the base with large brown or blackish lanceolate or ovate-lanceolate scales. *Fronde* tri-pinnatifid 3–4 $\frac{1}{2}$  ft. l., 1 $\frac{1}{2}$ –3 ft. w., chartaceous, or sub-coriaceous pellucid, dark green generally, paler beneath, naked above, puberulous beneath especially on the costales and ribs. *Rachis*, dark channelled, naked or sub-pubescent. *Pinnae* spreading sub-distinct petiolate 12–21 in. l., 6–10 in. w. lanceolate, oblong-lanceolate or ovate-lanceolate; *Pinnulae* approximate, the lower ones usually more or less stipitate, sometimes to a  $\frac{1}{4}$  in.; in other states quite sessile, oblong or ovate, lanceolate serrulate-acuminate, 3–6 in. l.,  $\frac{3}{4}$ –1 $\frac{1}{2}$  in. w. cut  $\frac{1}{2}$ – $\frac{5}{8}$  to the costae into close oblong, blunt or rounded segments, which are  $\frac{1}{3}$ – $\frac{3}{4}$  in. l., 2–4 li. w. The margins entire and even or sub-crenulate. *Veins* pinnate or the basal anterior one forked. *Sori* copious, linear 1–2 li. l., falling short of the margins, the lower ones longest and double. *Involucres* flat, membranous, brownish.—Hooker and Baker Syn. Fil., p. 241, Gr. Fl., B.W.I., p. 686.

(A.) *pallidum*, fronds much smaller, pinnulae less acuminate shallowly and broadly lobed. *Colour* pale green on both sides. *Sori* and *involucres* light coloured; rachis rather slender.

(B.) *var. crenatum*, *Fronde* the average size of the type, ultimate segments, sharply crenulate-dentate, the strongest tooth at the base, almost in the sinus; under *surface* rather more ciliate.

(C.) *var. remotum*, *Fronde* very large, *Pinnae* 1 $\frac{1}{2}$ –2 ft. l.  $\frac{3}{4}$ –1 ft. w. *Pinnulae* 5–6 in. l.  $1\frac{1}{2}$  in. b. stipitate deeply pinnatifid, segments  $\frac{3}{4}$ –1 in. l. 3–4 l. w. broadly rounded. *Veins* forked. *Costules* and ribs pubescent beneath.—*Diplazium Fee*.

Jamaica, St. Vincent, Trinidad and Guiana. Frequent in moist regions in forests and shady places, chiefly near streams and damp situations, in Jamaica from 2,000-45,000 ft. altitude. Trinidad at a lower elevation—the only countries I name specimens from. Variable in size, but otherwise unmistakable. Distinguished from *hians*, *Taylorianum*, and *altissimum*, which it resembles more or less in cutting, by the longer sori and flatter involucre, belonging in fact to typical *Diplazium* section, as distinct from *Anthyrium* to which those belong. I have remarked under *crenulatum* that the larger varieties placed under that species can hardly be distinguished from the smaller states of this. (A) is a small very pale state with the pinnules only slightly but rather broadly lobed. It grows at "Second breakfast" Spring, near Tweedside, St. Andrew, Jamaica. (B) is found at 5,000 ft. altitude near the Government Cinchona Plantation, Jamaica, and is marked by the sharp crenatures to the lobes. (C) is a very large state also from high altitudes (3,000-4,000 ft.) in Jamaica with the majority of the veins forked. With the fragmentary specimens seen in *herbaria*, this with some of its near allies is a very perplexing species, and it is not surprising that the gordian knot is sometimes cut by lumping them all together.—Cuba, Guadeloupe, Martinique, Southward to Brazil and Peru.

56. *A. arboreum*, WILLD.—*Stipites* tufted from an upright short scaly root-stock, a span to a foot long, channelled brown paleaceous at the base. *Fronde* pinnate lanceolate or oblong-lanceolate, usually a little reduced at the base, passing at the apex through lobes into the serrato-acuminate point, 10-18 in. l., 3-6 in. w. firmly chartaceous, pellucid-dotted, light rather glossy green. *Pinnæ* numerous, spreading nearly horizontally, acuminate,  $1\frac{1}{2}$ - $3\frac{1}{2}$  in. l.,  $\frac{1}{3}$ - $\frac{3}{4}$  in. w. close or subdistant, stipitate, cut away shortly on the lower side of the base, the upper expanded into rounded auricle, or cut into a partly free ovate segment. The margins beyond this subentire, serrate, or slightly lobato-serrate. *Rachis* moderately strong, wood-brown, glabrous, channelled. *Veins* forked, or distinctly pinnate (as they invariably are in the basal auricle) pellucid. *Sori* linear, oblique rather curved, 2-5 li. l., reaching  $\frac{2}{3}$  rds. to the margin, in a single series on each side of the mid-rib, or with short exterior patches as well on the inner part of the pinnæ.—Hooker and Baker, *Syn. Fil.*, p. 233. *A. auriculatum*, METT., *Gr. Fl.*, B.W.I., p. 685.

(A.) var. *unifolium*, pinnæ entire but crenato-serrate, not auricled except in the two or three lowest pair.

B. var. *pinnatifidum*, pinnæ uniformly lobed throughout along both sides to  $\frac{1}{3}$ rd deep, the basal lobe not free except in the lowest pinnæ.

(C.) var. *pinnulatum*, HOOK.—*Pinnæ* of the lower half, quarter, or less of the fronds with a distinct free ovate and cuneate pinnulæ on the upper side of the base.

(D.) var. *obtusum*, HOOK.—*Fronde* a span or over long; *pinnæ*  $1\frac{1}{4}$  in. l. or over, the upper ones entire, next below these auricled or lobed, the lower ones with a single, or pair of free pinnules at the base.—*A. semihastatum* var. *obtusum*, METT.

Jamaica and St. Vincent; in the former country common in forests and on shady banks from 3,500 feet altitude upwards. A well marked but exceedingly variable species. The typical state is characterised by the sub-entire pinnæ more or less auricled at the upper side of the base, the auricle more or less separated as a distinct obtuse or rounded segment. In (C) the lowest pinnæ have a free segment on both sides of the base. Only the larger fronds show an attempt to form an exterior row of short sori. Usually only the interior sori next the auricle are double. (B.) through being pinnatifid throughout on both

margins of the pinna is a very distinct form. The fronds are over a foot long and 3-4 in. w. Casually the pinnae are furcate at the ends. (*A*) has also a quite distinct aspect, the pinna being entire and not auricled at the base as a rule though the lower ones show a disposition thereto and in some cases have a free segment.—Cuba, Venezuela, and Brazil.

57. *A. semihastatum*, KUNZE.—*Stipites* slender, light brown or green 4-6 in. l. slightly paleaceous at the base. *Fronde*s lanceolate oblong or linear-lanceolate 6-9 in. l.  $1\frac{1}{2}$ - $2\frac{1}{2}$  or 3 in. w. bi-pinnate broadest or not reduced at the base, the apex passing through lobes firmly chartaceous pellucid-dotted, pale-green glossy naked, to the acuminate serrate point. *Pinnae* few, stipitate,  $1-1\frac{1}{2}$  in. l.  $\frac{3}{8}$ - $\frac{5}{8}$  in. w. the upper ones approximate but not close, sometimes sub-distant, entire or with more or less of a distinct auricle on the upper side of the base, the point bluntish; those of the lower half or two-thirds of the fronds distant,  $1-1\frac{1}{2}$  in. apart, deltoid-lanceolate, pinnate on both sides at the base, lobed beyond this, the point blunt entire and even or serrulate. *Segments* rounded, ovate, casually again somewhat lobed on the exterior side 4-5 li. l. 2-3 l. w. *Rachis* slender margined in the upper part. Veins forked, pinnate in the segments; *Sori* oblique, slightly short of both midrib and margins, 2-4 li. l. the longer inferior ones double.—Hooker and Baker Syn. Fil. p. 233. Gr. Fl. B.W.I. p. 685. *A. cubense*, Sp. Fil. vol. 3 t. 207.

Jamaica. Infrequent on rocky banks in forests at 15,000-2,000 ft. altitude. This resembles *arboreum* but is a more slender much smaller plant marked by the relatively few and very distant pinnae which in the lower half of the fronds are broad and fully pinnate at the base; the scales of the rootstock are small and light brown, and the sori reach almost from midrib to margins. I know only one locality for it, that is the western slope of the Chesterfield ridge, St. Mary, where it grows on rocky banks under forest, by the sides of streams, but other collectors have gathered it elsewhere.—Cuba.

58. *A. monticolum*, JENMAN.—*Stipites* tufted from a small brown-scaly rootstock, 6-12 in. l. slender scaly at the base, channelled; *Fronde*s 8-12 in. l. 3-5 in. w. lanceolate or ovate lanceolate bi-pinnate not reduced at the base, the apex pinnatifid and sharply serrato-acuminate. *Pinnae* numerous spreading at a broad angle, shortly stipitate, approximate or the lowest sub-distinct  $1\frac{1}{2}$ -2 in. l.  $\frac{1}{2}$ -1 in. b. bluntish or acute inaequalateral, lower ones broadest fully pinnate at the base, the underside shortly cut away, the upper deep, above, this pinnatifid or lobed, the outer part sub-entire and sharply serrated or bi-serrated. *Segments* oblong, or the interior free ones ovate-oblong 5-7 li. l. 2-3 li. w. rounded and dentate. *Rachis* rather slender naked, channelled, wood brown, margined with the membrane, decurrent segments at the top. *Veins* pinnate in the segments and lobes, the branches simple, or the inferior ones forked. *Sori* 1-3 li. l. curved, more or less short of the margins, only the inferior ones double.—Journal Botany, new series, vol. XI p. 326.

Jamaica—Infrequent on the slopes and sides of banks and rocks at 4,000-5,000 ft. altitude. Near the two preceding species and *A. Mildii* KUHN, of the Andes. From *semihastatum* it may be recognised by the larger size, numerous and proximate pinnae, which are more pinnatifid and lobed and sharply serrate. There is a casual and superficial resemblance too, to *Fadyeni* and *Franconis*; but the latter is much larger and more compound, and the former has laxer pinnules and is more pinnatifid in the outer part of the pinnae. In mature plants the abundant sori nearly conceal the involucre.—Endemic.

59. *A. Fadyeni*, Hook.—*Rootstock* shortly repent, thick, stout, and scaly. *Stipites* slender subtufed with a few dark-brown reticulated scales, like those of the rootstock at the base, 4–9 in. l., green or brownish. *Fronde* ovate-lanceolate, serrato-acuminate at the apex, the base as broad, or broader, than above, 5–9 in. l.,  $2\frac{1}{2}$ –4 (or 5) in. w. chartaceous, dark-green, naked. *Rachis*, slender, channelled light-brown or dull stramineous. *Pinnæ* lax apart or subdistant, petiolate, much the shape of the fronds, spreading, opposite or alternate,  $1\frac{1}{2}$ – $2\frac{1}{2}$  in. l.,  $\frac{3}{4}$ – $1\frac{1}{2}$  in. w. serrato-acuminate, broadest at the base, pinnate generally, but the lowest occasionally bi-pinnate. *Pinnule* lax sub-distant or distant, varying from ovate to lanceolate acute-pointed or blunt or even rounded, cuneate-stipitate,  $\frac{1}{3}$ – $\frac{3}{4}$  in. l.,  $1\frac{1}{2}$ –4 li. w. *Margins* sharply dentate, or in the larger pinnulæ inciso-lobate or fully pinnate at the base. *Veins* pinnate, simple or forked, linear  $1\frac{1}{2}$ –2 li. l., copious, reaching from the mid-rib nearly to the marginal teeth, the lower ones double. *Involucres* brownish, dark, Hook, 2nd Cent. Ferns, t. 27, Hooker and Baker Syn. Fil. p. 220, Gr. Fl., B.W.I., p. 684. *A. diminutum* Baker.

Jamaica, infrequent on the sides of wet dripping rocks, in shade, St. George, Portland parish, about 2,000 feet altitude; remarkable for its very lax arrangement of pinnæ and pinnulæ, all the parts sharply toothed or incisedentate. It grows on calcareous rocks, over which water constantly trickles, and the membrane is of a very dark colour, though the rachises are light. The type specimens gathered by Dr. McFadyen and named after him by the late Sir William Hooker were small, and did not show the Diplazoid involucres. Both rachis and costæ are flat and margined with membrane in the outer part, and show a tendency to be rather flexuose.—Endemic.

60. *A. Franconis*, METT.—*Rootstock* stout, erect clothed with large blackish lanceolate scales. *Stipites* cæspitose  $1\frac{1}{2}$ –2 ft. l. strong erecto-spreading, the base black and clothed like the rootstock, stramineous upwards and naked. *Fronde* tri-pinnate ovate-acuminate 2–3 ft. l.  $1\frac{1}{4}$ –2 ft. w. lowest pinnæ as large or little smaller than those above, chartaceous, pellucid, naked light-green and glossy above, beneath pale with an aureous tinge from the sori and involucres. *Pinnæ* spreading rather distant, lanceolate acuminate, petiolate to as much as an inch, 8–14 in. l. 3–5 in. w. *Pinnule* sub-distant, lanceolate, stipitate, deeper on the superior side 2–3 in. l.  $\frac{3}{4}$ –1 in. b. cut within, into ovate or oblong, blunt or rounded, crenate or dentate, free segments, which are 4–7 li. l.  $1\frac{1}{2}$ –3 li. w. passing upwards through similar close adnate decurrent, lobes into the serrato-acuminate apex of the pinnule. *Rachis* and costæ channelled stramineous and glabrous, the former often flexuose. *Veins* pinnate in the segments, the branches simple or forked, erecto-spreading. *Sori* copious  $1\frac{1}{2}$ –2 li. l. reaching the midrib to near the marginal teeth, the inferior ones double.—Hooker and Baker, Syn. Fil. p. 236. Gr. Fl. B.W.I. p. 687.

Jamaica, frequent in moist woods up to about 2,000 ft. altitude; the continental form is much smaller than the Jamaican and only bi-pinnate. It is frequently found barren in Jamaica, and in that state much resembles *Davallia inaequalis*. The pinnulæ are shortly cut away in a curve on the lower side of the base, the upperside being uniformly deeper and the interior segment the largest. Some fronds are never more than tri-pinnatifid, the underside of

fertile fronds from the blended colours of the surface and involucre, has a very pretty appearance. Though pinnæ and pinnulæ are distinct the tertiary segments are close and compact.—Mexico, Guatemala, Ecuador, and Peru.

61. *A. conchatum*, MOORE.—*Rootstock* stout, erect, clothed at the top with large lanceolate or ovate-lanceolate dark-brown, scales. *Stipites* cæspitose, erect  $1\frac{1}{2}$ – $2\frac{1}{2}$  ft. l. with similar scales to those of the rootstock clothing the dark bases glabrescent, channelled. *Fronds* bi-pinnatifid erecto-spreading, oblong-lanceolate acuminate, hardly narrowed at the base,  $2\frac{1}{2}$ –4 ft. l.,  $1$ – $1\frac{3}{4}$  ft. w. chartaceous pellucid dark-green glabrescent. *Pinnæ* very numerous, obliquely or horizontally, spreading, oblong-lanceolate, acuminate 6–10 in. l.,  $1\frac{1}{4}$ –2 in. w., approximate or more or less distant, shortly petiolate the apex serrate, between pinnatifid to a narrowly winged costa. *Segments* linear oblong 2–3 li. w.,  $\frac{3}{4}$ –1 in. l. horizontal blunt or rounded, rarely acute, more or less serrated, varying from close to as much as their own width between them; the sinuses sharp or more generally rounded. *Rachis* strong varying from light to dark-brown, puberulous or glabrescent. *Veins* simple or forked pellucid. *Sori* short  $\frac{1}{2}$ – $\frac{3}{4}$  li. l., close to the mid-rib and distant from the margin in the inferior ones double and casually some of the others also. *Involucre*s firm, persistent dark vaulted.—Hooker and Baker Syn. Fil., p. 228, Gr. Fl., B.W.I., p. 687.

(A.) var. *Tussaci* segments,  $\frac{1}{2}$  in. l.,  $1\frac{1}{2}$  l. w. round-pointed sinus open rounded. *Margins* faintly serrulate. *Sori*  $\frac{1}{2}$  li. l. *Anthyrium* Tussaci, Fée. Fil. Ant., t. 9, fig. 1.

(B.) var. *squamulosum*, margin freely lobate-dentate  $\frac{1}{3}$ – $\frac{1}{2}$  way to the mid-rib. *Athyrium squamulosum*, FÉE, Fil. Ant. t. 9, fig. 2.

Jamaica; Common near streams in forests and shady places from 1,500–4,000 ft. altitude. The pinnæ are invariably, simply pinnatifid, the costæ having a narrow wing of membrane to the very base. The species resembles the least cut form of *crenulatum*, in which the pinnæ are simply pinnatifid in the same way but it may at sight be distinguished by the very short sori and convex *Athyrioid* dark coloured involucre. As described, it presents three distinct varieties, but in the typical state there is also some variation, some of the sori are slightly arcuate.—Cuba and Hayti.

62. *A. hians*, KUNZE.—*Rootstock* stout, erect, 2–3 in. thick, 6–24 in. high, always in masses. *Stipites* cæspitose erect,  $2$ – $3\frac{1}{2}$  ft. l. channelled, furnished at the base with large ovate-lanceolate blackish scales, puberulous upwards, dark-coloured, tri-pinnatifid, or the smaller only bi-pinnate. *Fronds* 3– $4\frac{1}{2}$  ft. l.  $1\frac{1}{2}$ – $2\frac{1}{2}$  ft. w., lowest pinnæ not, or very little, reduced, the apex fully pinnate almost to the acuminate point; chartaceous pellucid, dark green, pale beneath, glabrescent, or the costules puberulous scaly beneath. *Pinnæ* spreading or erecto-spreading, oblong-lanceolate approximate,  $1$ – $1\frac{1}{2}$  ft. l. 3–6 in. w. *Pinnulæ*  $1\frac{1}{2}$ –3 in. l.  $\frac{1}{3}$ – $\frac{3}{4}$  in. w. numerous, sessile, sub-approximate, or sub-distant in the lower pinnæ oblong-lanceolate acuminate, the point serrate; cut  $\frac{2}{3}$ – $\frac{3}{4}$  to the costulæ into rounded sub-falcate or straight segments which are 4–5 li. l.  $1\frac{1}{2}$ –2 li. w. the *margins* even or faintly crenulate. *Veins* pinnate, branches simple, pellucid. *Sori* short, the lowest anterior double,  $\frac{1}{2}$ –1 li. l. reaching from the mid vein about half way to the margins. *Involucre*s

converse pale. *Rachis* strong, sub-angular dark-brown puberulous.—*A. australe*, Brackenr. in Gr. Fl. B.W.I. p. 686. Hooker and Baker, Syn. Fil. p. 241.

Jamaica, common in shady places near streams from 2,500–5,000 ft. altitude; gregarious. Well distinguished from *radicans* by its narrow pinnae and pinnulae and the shorter tumid involucre; the latter character also distinguishes it from the larger states of *crenulatum* which otherwise it closely resembles, the veinlets are usually 3–5 to a side in each lobe, 2–4 of which are fertile. Generally the pinnae are erecto-spreading the lower ones turned upwards by a short curve at the base of the costae. This is probably due to the crowded conditions of growth, arising from the gregarious habit, whereby one plant presses on another for room. Where the plant is found alone the pinnae spread as in other species. The texture is rather thin. Venezuela and Ecuador.

63. *A. altissimum*, JENMAN.—*Rootstock* stout, erect or decumbent, beset with the projecting bases of the past stipites. *Stipites* caespitose few, 2–3 ft. l., strong, dark-coloured naked upwards, scaly and densely muricate with raised points at the base. *Fronde* ovato-acuminate, tri-pinnatifid  $2\frac{1}{2}$ – $4\frac{1}{2}$  ft. l.,  $1\frac{1}{2}$ – $2\frac{1}{2}$  ft. w. little or not reduced at the base, chartaceous; above dark green, beneath pale, lurid, under surface puberulous, the costae and costulae slightly scaly, upper naked. *Rachis* and costae dark-coloured and channelled, the latter rather flexuose. *Pinnae* spreading, 12–18 in. l., 5–8 in. w., lanceolate or ovate-lanceolate, the apex pinnatifid and serrato-acuminate, the base petiolid. *Pinnulae* near or sub-distant, sub-stipitate lanceolate or oblong-lanceolate 3–4 in. l., 1– $1\frac{1}{2}$  in. w. serrato-acuminate, pinnatifid to the narrowly winged costulae, the inferior ones usually reduced. *Segments* close oblong round-ended  $\frac{1}{2}$ – $\frac{3}{4}$  in. l., 2–4 li. w. crenato-entire, or toothed or lobed half-way to the mid-rib. *Veins* pinnate, simple or forked. *Sori* short close to the mid-rib, a line or less long, the inferior often double. *Involucre* firm, converse, pale or cinnabar-brown.—Journal Botany, Vol. 8, p. 259.

Jamaica; frequent in depressions and ravines under forests of the highest ridges and slopes from 6,000–7,000 ft. altitude. In very moist situations the upper pinnae are bulbiferous in the axils. The lowest pair of pinnae are deeper on the lower side and petiolid an inch or more long. All the parts are dark and the rachis and costae rather scaly. The upper surface is very dark, and the under, bruno-viridi, upon which the at-first pale involucre, show conspicuously. The short tumid involucre clearly distinguish it from *radicans*, and the much broader parts from *hians*.—Endemic.

64. *A. Taylorianum*, JENMAN.—*Rootstock* and *stipites* not seen. *Fronde* ample tri-pinnatifid,  $2\frac{1}{2}$ –3 ft. l., 2 ft. w., dark green, rather membrano-chartaceous, glabrous and glossy except the costae and costulae which are slightly fibrillose and otherwise scaly beneath or in the axil. *Pinnae* spreading or erecto-spreading 10–12 in. or more long, 6 or more in w., petiolate from a  $\frac{1}{4}$ – $\frac{1}{2}$  in. *Pinnulae* spreading, contiguous sessile except perhaps the basal pair in the lower pinna truncate at the base, the much-acuminate point rather deeply serrated to the end,  $3$ – $3\frac{1}{2}$  in. l.,  $\frac{3}{4}$  to nearly 1 in. w., deeply pinnatifid to within a line of the mid-rib. *Segments* oblong, flat, broad, rounded, dentate, conspicuously in the outer part, 2, li. w., 4–5 li. l. *Veins* simple or the lowest anterior one sometimes forked, 4–5 to a side. *Sori* short nearer the mid-rib than margin, about  $\frac{1}{2}$  li. l., 3–4 to each side of the segments, the inferior anterior one double. *Involucre* vaulted membranous.

Jamaica; in forests at high altitudes. Of local species, this comes nearest *A. altissimum* from which it differs by its less robust character, thinner texture, sessile pinnulæ, conspicuously dentated final parts, the teeth rather obtuse and shorter sori. As in the preceding, the fronds are sometimes viviparous in the axils of the pinnæ and pinnulæ in the upper part of the frond. I have named this species in memory of the late Miss Fanny Hope Taylor, who in the years 1152-4 made an excellent collection of ferns in Jamaica, which included, among other rare species, the now well known and beautiful *Gymnogramme schizophylla*, a species only re-discovered where she found it, and named, over twenty years later.—Endemic.

65. *A. Filix-fœmina*, BERNH.—*Caudez* erect, scaly. *Stipites* tufted erect, paleaceous at the base, a few inches to a foot or over 1. *Fronde*s erect lanceolate or oblong-lanceolate bi-pinnate or tri-pinnatifid, chartaceous, dark green fibrous, the base usually more or less reduced  $1\frac{1}{2}$ –3 ft. l., 4–12 in. w., the rachises brown channelled. *Pinnæ* erect spreading very numerous, all except the lower ones contiguous, sessile, as broad or broadest at the base 3–8 in. l.  $\frac{3}{4}$ –1 $\frac{1}{2}$  in. w., the end acuminate and serrate. *Pinnulæ*s close,  $\frac{1}{2}$ – $\frac{3}{4}$  in. l., 1–3 li. l., sessile and broadest at the base, the point bluntish and toothed, the margins within that on both sides toothed or cut more or less to the midrib into segments, which are plainer or in the larger states again toothed at the end. *Veins* forked or simple. *Sori* copious short, at the base of the veins or their anterior branches, sub-reniform or curved-oblong. *Involucres* convex, pale, the same shape as the sori. Hook Sp. Fil. vol. 3 p. 217. Gard. Brit. Ferns t. 35.

The involucres in this species are peculiar, being just intermediate in the typical state uniform between the short straight sori of typical *Asplenium*, and the truly reniform of *Nephrodium*. They vary however to strictly oblong in some of the varieties. Like *Nephrodium*, *Filix Mas*, of which in this genus it is the analogue, it has a very wide range in temperate regions of the world and consequently varies somewhat. In Europe its variation is directed into abnormal forms, of which there are many. In tropical countries it is found at high elevations. It might be looked for in the more elevated parts of Jamaica, Guiana, and perhaps Honduras, North and Central America, Cuba and Venezuela,\* Europe, Asia, and Africa.

66. *A. crenatum*, RUPRECHT.—*Rootstock* repent. *Stipites* scattered erect, a span to a foot long, brown or stramineous, scaly at the base, the scales large and dark. *Fronde*s deltoid  $\frac{3}{4}$  ft. in length, and width, membranous more or less hairy or naked, bi-tripinnate. *Pinnæ* spreading, the lowest pair largest and 6–9 in. l.,  $1\frac{1}{2}$ –2 in. w., shortly petiolate. *Pinnulæ* 1–2 in. l. ovate-oblong, deeply pinnatifid or at the base fully pinnate, the segments  $1\frac{1}{2}$ –2 li. l. 1 li. w. and bluntly toothed. *Veins* forked or simple. *Sori* short, oblong, straight or curved, often double. *Involucres* pale, finally tumid. *A. crenatum* FRIES.

Bermuda—This has a good deal of the final cutting of *Filix foemina*, but the shape of the frond is quite different and the rootstock is repent. It only enters the most northern region of this flora.—Scandinavia to Japan.

67. *A. Wilsoni*, BAKER. *Rootstock* stout, erect, or decumbent, the crown clothed with large blackish lanceolate scales. *Stipites* cæspitose, sub-angular below and clothed like the rootstock, upwards channelled very dark-coloured, punderulous, 1–2 ft. l. *Fronde*s 19–3 ft. l., 12–21 in. w. oblong or ovate-acuminate, not, or little reduced at

\* It does not appear that this species belongs to the West Indian and Guiana Flora.—[Ed.]



Veins free.—Sp. 1-14.

Fronds entire or pinnate.

Sp. 1-6.

Fronds entire, or with the base only lobed.

1. *A. Plaschnickianum*.

Fronds entire at the top, the base pinnate.

2. *A. rhizophyllum*.

Fronds pinnatifid or pinnate, the pinnæ adnate at the base.

3. *A. glandulosum*.

Fronds pinnate, pinnæ quite entire.

4. *A. semicordatum*.

Fronds pinnate, margin of the pinnæ subentire or shallowly lobed.

5. *A. juglandifolium*.

6. *A. subobliquatum*.

Fronds pinnate or bi-pinnate, angles of the segments usually mucronate or awn tipped.

Sp. 7-14.

Fronds pinnate, rachis densely paleaceous.

7. *A. Mucronatum*.

Fronds pinnate or bi-pinnate or tri-pinnate.

8. *A. triangulum*.

9. *A. tridens*.

10. *A. viviparum*.

11. *A. aculeatum*.

Fronds oblong, lowest pinnæ not enlarged.

12. *A. Christianæ*.

13. *A. melanochlamys*.

Fronds deltoid, lowest pinnæ largest sp. 14.

14. *A. Capense*.

Veins united—15-18.

Veins copiously areolated—15-16.

Fronds entire.

15. *A. plantagineum*.

Fronds usually 3-5 foliate.

16. *A. trifoliatum*.

Primary veins not costate the opposite veinlets united. Sp. 17-18.

Barren and fertile fronds different.

17. *A. meniscioides*.

Fronds uniform.

18. *A. abbreviatum*.

1. *A. Plaschnickianum*, KUNZE.—*Stipites* densely tufted from a short upright or oblique scaly and fibrous rootstock, slender pale-coloured, fibrillose. 4-7 in. l. Fronds erect, 4-5 in. l.,  $\frac{3}{4}$ -1 in. w. linear-oblong rounded and broadest at the base, from that tapering to the blunt retuse viviparous apex, sub-entire, or sinuate, or more or less lobed in the lower part, sometimes with a pair of quite free rounded segments at the base, coriaceous, upper surface dark-green

and nearly or quite naked; under, pale and slightly fibrillose especially along the midrib margins faintly crenulate, especially towards the base. *Veins* in groups, repeatedly forked, flabellate in the lobes. *Sori* medial on the veins in one or more rows, appearing scattered when plentiful. *Involucres* peltate, orbicular, deciduous.—Hook, sp. Fil. Vol. 4, t. 211, Syn. Fil. p. 249.

Jamaica—Common in forests and on shady wayside banks and rocks above 4,000 feet altitude; united by Grisebach with the next species from which it differs definitely however by its erect habit, coriaceous entire and little cut fronds. The bud at the end of the midrib is at first clothed with scales, subsequently little circular petiolid fronds are produced and blackish fibrous roots, occasionally the fronds are furcate at the apex each branch viviparous. While young the plants are fibrillose-scaly throughout on both sides of the fronds, the stipites very freely so.—Endemic.

2. *A. rhizophyllum*, SWARTZ.—*Stipites* caespitose from a small very scaly fibrous rootstock, slender, spreading light coloured freely fibrillose,  $\frac{1}{2}$ – $1\frac{1}{2}$  in. l. *Fronde*s prostrate, spreading, chartaceous or sub-coriaceous 4–6 in. l.  $\frac{1}{2}$ – $\frac{3}{4}$  of an in. w. with a long tapering linear acuminate entire upper part, viviparous and radicant at the tip, and a pinnate lower half, or two thirds, in which the pinnae are quite free sub-distant, ovate-oblong, rounded, usually at both ends, or the base sub-cuneate, 4–6 l. l. 2–3 l. b. faintly crenulate or even margined. *Rachis* very slender light-coloured channelled slightly fibrillose, under surface paler than the upper and slightly scaly. *Veins* forked, pinnate in the segments. *Sori* in 1–2 rows, usually confined to the upper entire part, but sometimes also appearing on the pinnae. *Involucres* peltate orbicular at length dropping away.—Hook. and Grev. Icon. Fil. t. 59, Gr. Fl. B.W.I. p. 689.

Jamaica, in well drained stony woods on rocks, and boulders, up to 1,000 feet altitude or more. S. Mary, at the top of the wooded hill opposite Castleton Gardens. No doubt this is closely allied to the preceding having similar vestiture, yet it is very distinct. The fronds are quite prostrate, and spread all round on the surface upon which the plants are growing. The entire upper part of each one is very much attenuated and not more than  $\frac{1}{2}$ –1 l. w. at the proliferous tip. The buds are similar in character to those of the preceding but are smaller and the plant is altogether weaker than that species.—Cuba.

3. *A. glandulosum*, HOOK and GREV.—*Rootstock*, short, erect, fibrous, and very densely clothed with light-coloured, bright delicate scales. *Stipites*  $\frac{1}{4}$ –1 in. l. caespitose clothed freely like the rootstock. *Fronde*s erecto-spreading lanceolate or oblong-lanceolate, 5–12 in. l. or over 1–3 in. w. acuminate but blackish at the apex tapering at the base, pinnatifid to a slightly marginal rachis or freely pinnate at the base; chartaceous-herbaceous, pellucid dotted, pale green naked of scales, but densely glandulose on both sides as is also the rachis. Pinnae very numerous, spreading fully adnate and decurrent at the base dwindling downwards to a small deltoid auricles rather apart  $\frac{1}{2}$ – $1\frac{1}{2}$  in. l. 2–6 l. w. blunt or rounded at the point, rather auricled on the upperside of the base; the margins dentate-crenate, or more or less sinuato-lobate and dentate in the large states 1–3 times forked, anterior branch longest and fertile. *Sori* medial forming a row on each side of the middle, distant in the larger fronds. *Involucres* peltate, orbicular, deciduous or not.—Hook. and Grev. Icon. t. 140. *A viscidulum*; MERT. Gr. Fl. B.W.I. p. 689.

Jamaica.—On rocky banks and skirts of forests from 1,500–3,000 feet altitude plentiful in one place at least, between Gordon Town and Guava Ridge, a pretty and distinct plant usually small, but occasionally with fronds over a foot long and three inches wide. Densely viscid while green. The colour is a very light green that becomes pale brown in drying. In small fronds the sori are confined to the outer part of the segments and often to the upper half of the fronds.—Cuba.

4. *A. semicordatum*, SWARTZ.—*Rootstock* stout upright, fibrous, the crown densely clothed with long dark-brown fibrillose scales. *Stipites* cæspitose, 4 in. l. strong freely coated like the rootstock. *Fronde* pinnate to the apex, with a similar terminal pinnæ, lanceolate 2–3 ft. l. 6–9 in. w. dark green glossy, on the upper side naked. *Pinnæ* very numerous alternate, spreading horizontally, close or sub-distant linear-oblong and acuminate 3–5 in. l. 5–8 li. w. base free, cordate, the lower side auriculate, sessile, lower ones gradually reduced; margins even or sub-crenulate. *Rachis* strong, sub-angular naked or more or less fibrillose. *Veins* close, spreading at a wide angle, less than right 2–3 times forked. *Sori* close, in 1–3 contiguous parallel rows on both sides the mid rib. *Involucres* firm orbicular, and peltate, dark-coloured, quite embracing the sori, deciduous with age. (Cyclopeltis, J. Smith) Hooker and Baker Syn. Fil. p. 249, Gr. Fl. B.W.I. p. 689.

Jamaica, St. Vincent, Trinidad; frequent on banks and limestone rocks, both fully exposed and in shade, below 2,000 feet altitude; very abundant on the Manchester mountains, Jamaica, and in other parts of the island. A fine well marked species, the sori as well as the involucres drop away with age. In some cases the pinnæ dwindle to mere half-round or deltoid auricles  $\frac{1}{4}$  in. deep which extend considerably down the petiole, and in others they are not less than 2 in. l. and remote from the base of the stipe. The auricle at the base of the pinnæ overlaps the rachis. There is a form with the pinnæ furcate at the end, fish-tail like.—West Indies and from Panama to Brazil and Peru; and there is an allied East Indies form.

5. *A. juglandifolium*, KUNZE.—*Rootstock* prostrate, stout, and woody, elongated, clothed freely at the end with linear ferruginous brown scales  $\frac{1}{4}$ – $\frac{1}{2}$  in. l., thickly beset with the *stipites* which are erect, brown or pale castaneous, channelled, glossy, naked, or rather scurfy and distinctly scaly, the scales of the rootstock ascending the base and deciduous. *Fronde* pinnate-truncate at the base; coriaceous dark-green above and glossy, pale beneath, naked or rusty furfuraceous beneath on the costæ,  $1\frac{1}{2}$ – $2\frac{1}{2}$  ft. l.  $1\frac{1}{2}$  ft. w. the apex lobed and serrate-acuminate. *Rachis* like the stipe. *Pinnæ* spreading about 20 to a side, more or less, distant even to the top of the frond, the lower slightly stipitate and sub-rounded at the base, the upper auricled on the superior side ligulate, 6–9 in. l.  $\frac{3}{4}$ –1 in. w. the shallow rounded-appressed lobes of the margins passing into sharp deep slightly falcate serratures at the acuminate point. *Veins* pinnate the opposite branches not uniting, the inferior falling short in the parenchyma. *Sori* copious, terminal or dorsal on the veins, rather sunk, and papillose on the upper side; receptacle copiously scaly. *Involucres* pale, peltate-orbicular, deciduous.—Gr. Fl. B.W.I. l. in part.

Guiana; gathered in the forest on the slope of a ridge near Mt. Ray-wa. A stronger and larger plant than either of its allies, *abbreviatum* and *sub-obliquatum* with a much shorter rootstock than the former quite different

vestiture, and much more thickly set with stipites. The lobing of the margin is uniform, the lobes rather appressed passing into copiously sharp deep, falcate teeth at the acuminate apex. The lower pinnae are not auricled, those next above them are, but the feature is gradually lost again in the uppermost of all. The veins are pinnate, but the branches form fascicles of 3-6 and all run into the margin except the lowest anterior one, which falls short in the parenchyma. On this the sori are terminal, on the rest dorsal. In Hooker's Sp. Fil. Vol. 4, pl. 234, fig. 4, represents a portion of a pinnae with free venation but it differs from this by all the veinlets being there shown disconnected, and shortened in the parenchyma.

6. *A. sub-obliquatum*, JENM.—*Rootstock* decumbent or sub-erect, rather stout, and woody, clothed with minute brown scales. *Stipites* contiguous, erect, a few small deciduous scales at the base, above this naked and brown stramineous, channelled 1-1½ or 2 ft. *Fronde*s erect, pinnate, sub-coriaceous, light green glossy and naked, plentifully pellucid dotted, 9-18 in. l., 3-9 in. w. the base truncate, the apex lobate serrate-acuminate, oblong-lanceolate or ovate. *Rachis* brown, stramineous channelled glabrous. *Pinnæ* spreading, horizontal or not, 12-20 to a side, slightly stipitate, ligulate-lanceolate, the base sub-truncate, or slightly incised on the inferior side, the margins slightly or more or less deeply cut into appressed or rounded lobes, the lowest of which on the superior side being as a rule enlarged, passing at the acuminate point into blunt shallow teeth or lobules, 1½-5 in. l. ⅓-1¼ in. w. Veins pinnate, 2-5 to a side, running to the sinus or margin of which they often fall short, the lowest anterior ones often shortened in the parenchyma. *Sori* copious, medial, mostly dorsal on the vein, slightly pitted, and papillose, on the upper side, receptacles small, scaly. *Involucres* pale, peltate-orbicular, deciduous.—*Polypodium*, Hook. *Nephrodium*, Baker.

Guiana; gathered commonly in the forest of the Potaro valley, below the Kaitour Fall, and on the top of Mt. Ray-wa. This is a smaller plant than *juglandifolium* and *abbreviatum* but variable in size and cutting. The colour is pale, and dries a brown straw green. The fronds very much in shape, are narrow and oblong-lanceolate, or broad and ovate. The pinnae also vary in size and depth of lobing. The basal lobe on the upperside is almost invariably enlarged, little or more, and as a rule there is a slight incision on the opposite side. Possibly there are two local forms. The veins as a rule are simple, in size and form there is a resemblance to *Polypodium tetragonum* but in both this and *juglandifolium* there is no distinct terminal pinnae to the frond, the pinnae dwindling gradually through lobes to the point.—Brazil.

7. *A. mucronatum*, SWARTZ.—*Rootstock* usually upright, stout fibrous and very densely paleaceous, and fibrillose. *Stipites* strong, spreading cæspitose, 3-10 in. l., thickly clothed like the rootstock. *Fronde*s spreading around, pinnate, 1-2½ ft. l., 1½-3 in w., acuminate reduced at the base; very coriaceous glossy dark green above and nearly or quite naked; beneath pale and slightly rusty ciliate, the rachis strong channelled and densely rusty-fibrillose. *Pinnæ* sessile very numerous, spreading horizontally, close and often imbricating, sub-distant in the lower part, 1-1¾ in. l. 4-5 l., b.; truncate and auricled on the upper side of the base, the inferior shortly cut away and often hollow, tapering outwards the apex, acuminate and mucronate. *Margins*, cartilaginous-edged, sub-entire or more or less deeply crenate-serrulate teeth rounded, or appressed and slightly mucronate. *Veins* obscure very oblique, 2-3 times forked. *Sori* copious, uniserial on each side, nearer the margin than midrib.

*Involucres*, circular, peltate, deciduous.—Hook. Sp. Fil. Vol. 4, t. 216. Gr. Fl. B.W.I. p. 989. *A. var. pinnatifidum*, *Fronde*s, 4–5 in. w. pinnæ  $\frac{1}{2}$  in. w. lobed or deeply pinnatifid, lobes sharp and mucronate.

Jamaica: abundant in dry woods and on shady and open banks from 4,000–6,000 feet altitude. Remarkable for its dark colour and copious ferruginous vestiture of the crown and main rachis, the former, ascending the petioles, the vestiture is of a mixed character—large pale which are often tinged black, and fine fibrillæ or tomentum. The sori become dark-brown with age, often blackish. They are sunk in the surface, which is papillose on the upper side. The lower reduced pinnæ are generally barren. The veins are pinnate in the basal auricles, and the sori in a double series. There is a fasciated form, gathered by Nock, that is repeatedly furcate. It is a well individualized species much more robust and not nearly so variable as the next.—Guadeloupe, Haiti, and according to Grisebach, Venezuela.

8. *A. triangulum*. SWARTZ.—*Rootstock* usually upright, fibrous, clothed with glossy, blackish, brown-margined scales. *Stipites* tufted, rather slender, clothed especially at the base with dark brown palæ, above this deciduously fibrillose, as is less so the rachis, 3–9 in. l. *Fronde*s 9–18 in. l. 1–2 $\frac{1}{2}$  in. w. erect or spreading, pinnate, acuminate, not proliferate, usually somewhat reduced at the base, very coriaceous naked or the underside slightly filamentose-scaly, light green. *Pinnæ* spreading, often rather falcate, very numerous, close above and sub-distant below,  $\frac{1}{2}$ –1 in. l. 2–6 l. w. deltoid, lanceolate, or ovate-lanceolate, the base expanded and auricled on the upper or both sides, the lower usually obliquely cut away, the auricles and point mucronate; the margins sub-entire or dentate spinescent. *Rachis* rather slender, pale-brown naked or fibrillose. *Veins* close, very oblique 2–3 times forked, pinnate in the auricle. *Sori* forming a nearly medial row on each side of the mid rib. *Involucres*, circular, peltate, deciduous.—Hooker and Baker Syn. Fil. p. 250. Gr. Fl. B. W. I. p. 689.

(*A.*) var., Size and form of the type, but apex of the fronds retuse and viviparous.

(*B.*) var., *Pinnæ* 1 $\frac{1}{2}$  in. l. deeply inciso-dentate and spinulose, the auricle deep but not free, *Polystichum laxum*.—J. SYM.

(*C.*) var. *Pinnæ* not reduced at the base of the frond, stipitate ovate,  $\frac{3}{4}$ –1 $\frac{1}{4}$  in. l. 6–7 l. w. above the auricle, which is fully connected or more or less free, forming an ovate segment, margins freely spinulose-dentate.

Jamaica; common on rocks and dry banks, from 2,000–6,000 feet altitude, general in elevated districts all through the country. A very variable species. The variation speaking only of the forms here associated with the type, occurs in the size of the fronds, the size and shape of the pinnæ, and the degree of their spinescent dentation. There is a small prostrate state, with few pinnæ only 2 or 3 in. l. hardly spinulose at the angles. In some forms the pinnæ are flat in others they are undulate with the spiny teeth projecting at different angles, which gives the leaflets a very holly-like aspect. In this species too the sori often turn black at maturity. Variety (*B.*) is fig. 1 of Sloane's History t. 36.

Some of the following plants associated here with this species, might well, seen alone, be regarded as distinct, but the numerous links show that they are only modifications of this type. One or two of them run almost into *aculeatum* from which the rigid texture is about the most reliable distinguishing character.

(A.) Sub. sp. *caudatum*. *Stipites* 4–8 in. l., scaly at the base cœspitose springing from a decumbent or upright rootstock. *Fronde*s spreading or prostrate, lanceolate or oblong-lanceolate, tapering gradually upwards and terminating (both the barren and the fertile alike) into a 1–2 in. l., naked stiffish tail with a scaly bud at its summit. *Pinnæ* numerous, horizontal, apart but contiguous, the lower one hardly or little reduced, 1–1½ in. l.  $\frac{1}{3}$ – $\frac{1}{2}$  in. w. bluntish or acute serrulate or lobulate, not at all spinulose. *A. caudatum*, JENM. Journ. Bot. Vol. 8. p. 260.

Jamaica; frequent in the Western parishes above 1,500 or 2,000 feet altitude. In this as a rule, the rigidity and spinulosity of the type are quite wanting, but odd fronds present indications of these characters. The *pinnæ* are oblong-lanceolate, the upper base being also margined, terminating in a scaly bud or young plant.

(B.) Sub. sp. *rhizophorum*. *Stipites* slender, slightly scaly, spreading 3–9 in. l., prostrate or spreading. *Fronde*s 6–10 in. l., 1–2 in. w. pinnate or hardly reduced at the base the apex of the barren ones terminating in a slender pliant, often thread-like radiant tail several inches long. *Pinnæ* contiguous or more or less apart or distant, auricled at the base the margins even, crenate, or dentate, but not much spinescent. *Rachis* slender.

(a.) var. *bi-pinnatum*. *Stipites* a foot or less long, slender scaly at the base. *Fronde*s a foot or more l., uniformly fully bi-pinnate passing into a short slender straight radiant tail at the apex.

Jamaica; frequent on the Red Hills near Kingston and extending through the Western Parishes. This resembles *Polypodium reptans*, Sw. in habit, the fertile fronds being erect, devoid of a tail, as a rule, and acuminate and with petioles twice as long as those of the barren ones. In the latter the upper *pinnæ* become gradually more distant, terminating abruptly. The roots are reddish-yellow. This is somewhat different from *Polystichum iticifolium*, FEE, Wright n. 829, Cuba, in which the fronds are narrower, the *pinnæ* as broad as long, and very spinulose at the angles. Wright n. 828 is near our plant. The variety (a) found in the Western Parishes differs only from *A. aculeatum*, Sw, by the tailed apex and its coriaceous texture, and is a nearly complete final link in the series of forms passing from typical *triangulum*, as that species.

(C.) Sub. sp. *latipinnum*. *Stipites* 4–8 in. l., deciduously scaly brown. *Fronde*s pinnate, pinnatifid in the upper part, terminating in a retuse, viviparous apex, erect, spreading, 8–12 in. l., 1½–2¾ in. b. the base truncate. *Pinnæ* 1–1½ in. l.,  $\frac{1}{2}$ – $\frac{3}{4}$  in. w. margins plain or with shallow appressed teeth, the acute point mucronate. Complete row of sori medial 1–2 incomplete outer rows. *Rachis* fibrillose-naked. *A. triangulum*, Sw., var. *latipinnum*, JENM. Journ. Bot. Vol. 8. p. 260.

Jamaica; Arnolly Gap, 2,000 feet altitude. This in its dark colour and dark vestiture diverges somewhat from the group, but the affinity is all the same quite unmistakeable. It is further marked by its flat pinnatifid proliferous upper part. In the smaller states the upper part is sub-entire, suggesting very strongly the connection of *rhizophyllum* and *Plaschnickianum* with the group. A small plant in the British Museum marked by me var. *Willsianum*, probably belongs here.

9. *A. tridens*, Hook. *Rootstock* oblique or upright, densely clothed with blackish scales. *Stipites* densely tufted, slender 3–6 in. l., the upper scales becoming brown. *Fronde*s pinnate or bi-pinnate

spreading linear—lanceolate, acuminate, base not reduced. 6–12 in. l., 1–2 in. br., very rigid. *Pinnæ* very numerous cuneate—stipitate, tri-partite the central segment much the largest and inciso-dentate at the base as also are the spreading lateral ones in the larger fronds. The parts sharply spinulose. *A tridens*, Hook. sp. Fil. p. Vol. 4 t. 215. Syn. Fil. p. 251.

Jamaica; on dry banks in the Port Royal mountains, from 2,500 to 4,000 ft. altitude; gathered near Arntully Gap 2,500 ft. altitude. A peculiar pretty plant usually very uniform and definite in its characters, still varying somewhat and very distinctly of this group. In small fronds the *pinnæ* are very nearly trifid, but in the lateral segments are free and cuneate at the base; occasionally a plant is found in which the segment on the underside is much reduced, showing a closer passage to the type.

10. *A. viviparum*. Fee. *Rootstock* stout, densely clothed with large blackish-brown scales. *Stipites* cæspitose 4–6 in. l., erect, spreading strong, clothed at the base like the rootstock, above fibrillose or naked. *Fronde*s rigid lanceolate or oblong lanceolate, spreading bi-pinnate tapering at the apex to the blunt viviparous summit. *Pinnæ* spreading, very numerous, acute, oblong-lanceolate 2–3 in. l.,  $\frac{1}{2}$ – $\frac{3}{4}$  in. br., fully pinnate within, the outer part pinnatifid. *Segments* close, rather imbricating, ovate mucronate, the interior one on the superior side enlarged more apart and free than the rest, 4–6 li. l., 2–3 li. w., their margins even. *Rachis* strong, decidedly fibrillose. Sori copious, bi-serial. *Polystichum viviparum*. Fée. Mem. p. 21, tab. 3, fig. 3. *Aspidium viviparum*, Hook and Baker Syn. Fil. p. 251.

(a.) *var. trapezoides*. SWARTZ. *Fronde*s exactly similar, but *pinnæ* only serrate or inciso-serrate, the auricled base on the upper side sometimes separated into a free spinulose pointed ovate free segment. Sloane's Hist t. 36, fig. 5. *Aspidium trapezoides*. SWARTZ.

Jamaica; common in light stony woods and on similar shady banks, at 2,000–3,000 ft. altitude. St. George, Portland Parish (gathered at Clydesdale) the variety in the Western parishes, Clarendon, Manchester and St. Elizabeth. A strong robust plant, very coriaceous, the two states described being each very uniform in itself; in the former the fronds gracefully arch over and root at the apex and the *pinnæ* are uniformly pinnate-pinnatifid along both sides, the segments ovate crowded and sharply spinulose at the point; in the latter the fronds are not radican and the *pinnæ* are only serrated or lobed only at the upper base. This latter is often mistaken for *A mucronatum*, Sw. which in form it closely resembles, but differs from in its paler colour, and, chiefly the absence of the demi-rusty vestiture which clothes the rachis of that species.—Cuba.

11. *A. aculeatum*, SWARTZ.—*Stipites* cæspitose from an upright densely paleaceous rootstock, 6–15 in. l., thickly clothed with ovate, or lanceolate brown scales at the base, fibrillose upwards. *Fronde*s lanceolate or ovate-lanceolate, acuminate narrowed, more or less abruptly upwards, 1–2 ft. l., 3–8 in. w. broadest in the lower part firm or sub-coriaceous; *rachis* and *costæ* reddish-fibrillose the latter margined; upper surface glabrous, glossy, green, under, rather fibrillose or naked, and paler. *Pinnæ* distant or sub-distant below, close above, spreading, oblong or lanceolate, blunt or acuminate, the lowest not or little reduced,  $1\frac{1}{2}$ –4 in. l.,  $\frac{1}{2}$ – $1\frac{1}{4}$  in. w. pinnate. *Pinnulæ* close, ovate-rhomboidal the base on the upper side truncate and sub-auricled, cut away on the under, 3–8 l. l., 2–3 l. w.; upper

and outer margins crenate-dentate, the teeth and point aristate. *Veins* repeatedly forked or pinnate. *Sori* medial, uniserial on each side or duplicated in the auricle; involucre orbicular, deciduous—Hooker and Baker, Syn. Fil. p. 252, Gr. Fl. B.W.I. p. 689. Eat. Fer. N. Ann. p. 62.

Jamaica; common in shady and moist situations above 4,000 feet altitude. Very variable. I have included two forms which seem to pass gradually one into the other. The smallest state of all is 1-1½ in. w. and bi-pinnate only at the base. The larger is *Phegopteridium*, BAKER. This and the next have an evident connection with the *triangulatum* group, but the habit is more lax the texture thinner and teeth not rigid. In the minor forms the pinnulæ are crenate at the base and ovate oblong or in some instances sub-spathulate, and the texture is herbaceous. The larger state varies in the size of the pinnules. That with the broadest and flattest is *Polypodium platyphyllum*, Hook. *Aspidium*, WILLD. *Phegopteris*, METT. Syn. Fil. p. 310, which is generally found without involucres. From one-third to half the upper part of the frond is simply pinnate in even the larger states, and tapering, spread in varying forms throughout the tropical and temperate regions of the globe and entering the Arctic zone.

(A.) Sub-sp. *A. Moritzianum*, KLOTZSCH. *Rootstock* stout upright densely paleaceous. *Stipites* 1½-2 ft. l., clothed like the rootstock at the base and fibrillose upwards as is also the rachis and costæ. *Fronde* 2½-3½ ft. l., 1½-1¾ ft. br., oblong suddenly and shortly acuminate at the top. *Pinnæ* spreading horizontally, contiguous above, distant or sub-distant below, sessile, linear-oblong. *A. Moritzianum*, KUNZE. *A. ordinatum*, KL., in Linnea 20 p. 361. *Polystichum gigantum*, FÉE.

Jamaica; common on the banks of streams in forests at 4,000-6,000 ft. altitude; also ascribed to Trinidad. A much larger plant than the type, of a uniform width from the base upwards shortly, acuminate at the top, and densely paleaceous. The auricle forms a free segment in the basal pinnules and the vestiture of the rachis and costæ sticks to the surface like cobweb. *Polypodium rigidum*, Hook. and Grev., Icon. t. 163 and Syn. Fil. p. 310, is this without involucres—Mexico to Venezuela Brazil and Peru.

12. *A. Christianæ*, JENM. N. SP.—*Rootstock* erect or decumbent, stout, densely clothed with large ovate-lanceolate black scales. *Stipites* caespitose, erect, 1-1½ ft. l., channelled clothed at the base like the rootstock and upwards with appressed, rather matted tomentum. *Fronde* erect, bi-tripinnate acuminate chartaceous, light green naked or the under surface glabrescent; *Fronde* erect, bi-tripinnate oblong 1½-2 ft. l., 9-12 in. w. not, or little, reduced at the base; *rachis* channelled, flat, and margined in the upper part, terminating often in a scaly bud, and with the channelled and flattish costæ clothed with deciduous pale appressed tomentum. *Pinnæ* numerous, 5-7 in. l., 1½-1¾ in. w. spreading, oblong lanceolate serrato-acuminate rather apart, or the lower ones sub-distant, stipitate pinnate; *pinnulæ* numerous, apart but contiguous, 1-1¼ in. l., 5-7 l. w., ovate-oblong, acute or bluntish, obliquely cuneato-stipitate, pinnatifid oblong both sides or only on the upper side within, the opposite under side cut away, the outer part lobed and the point dentate, *segments*, oblong, rounded the end faintly crenate, the interior ones on the upper side the largest and deepest and 3-5 l. l. 1½-2 l. w.; *lobes* and teeth of the outer part of the pinnules rounded.



*Veins* repeatedly forked. Sori terminal on the lowest or lower veinlets, biserial in the larger lobes and outer part of the pinnulæ. *Involucres* orbicular deciduous.

Jamaica.—Common in woods on the Manchester mountains at 2,000 feet altitude. The pinnulæ are much larger and laxer than in the preceding, and the teeth are not aristate. The involucres fall away early, and the sporangia are mixed with scales. Mr. Baker unites this with his *Nephrodium patulum* a plant also common in Jamaica and clearly distinct. Though the vestiture is striking and abundant, it is deciduous and specimens often appear quite naked. It is very near in form and cutting. *N. Mexicanum*, Hook.—Endemic.

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13. *A. melanochlamys*, Hook. *Rootstock* oblique or erect, very densely clothed with dark brown aciculate scales. *Stipites* tufted erect, a foot l., castaneous, rather glossy, fibrillose throughout and densely clothed at the base like the rootstock, sub-tetragonal and channelled. *Fronde*s  $1\frac{1}{4}$ –2 feet l.,  $\frac{3}{4}$ –1 ft. w., tripinnatifid or fully pinnatè, chartaceous, dark-green, freely fibrillose on the castaneous or light brown rachis, costæ and ribs. *Pinnæ* spreading horizontally, lowest equilateral like the rest 5–6 in. l.  $2-2\frac{1}{2}$  in. b., sessile pinnules apart spreading,  $1-1\frac{1}{4}$  in. l., 2–3 li. b., sessile, the same width from the base to the blunt lobed point, and deeply pinnatifid, the base quite pinnate. Segments  $1-1\frac{1}{2}$  li. l.,  $\frac{3}{4}$  li. b. oblong deltoid, oblique and decurrent with an open space between them, the end rounded. *Veins* pinnate in the segments to which there are 4 to 6 sori. *Involucres* ample, peltate orbicular with a tendency toward reniform. Hooker and Baker Syn. Fil. p. 256. Sp. Fil. t. 233. fig. *A. Polystichum* Fée.

A species well distinguished by its very copious castaneous vestiture which extends from the rootstock where it is exceedingly dense, diminishing in size and quantity of the scales to the final ramification of the ribs. The involucres are intermediate in form between peltate—orbicular and reniform, but until mature are the former.—Cuba.

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14. *A. capense*, Willd'.—*Rootstock* creeping, stoutish, densely clothed with reddish scales. *Stipites* apart, strong sub-pendant, faintly channelled, densely scaly at the base, and deciduously fibrillose upwards, 6–10 in. l. *Fronde*s nearly deltoid,  $1-1\frac{1}{2}$  ft. l., 9–15 in. b. widest at the base, thence tapering to the serrato-acuminato apex, fully tri-pinnate; coriaceous, of a glossy pale colour. *Rachis* and costæ stramineous, deciduously fibrillose, bi-channelled. *Pinnæ* approximate lanceolate, or the lower ones elongato-deltoid the lowest pair deeper on the interior side and 6–9 in. l., 4–6 in. b., serrato-acuminate as are those above, petiolate  $\frac{1}{2}$ –1 in. l. pinnulæ stipitate, ovate or lanceolate, the larger pinnate and serrato-acuminate the smaller acute sub-entire and serrate; tertiary segments ovate or lanceolate and dentate, the larger bluntly lobed at the base,  $\frac{1}{2}$ –1 in. l.  $\frac{1}{4}$ – $\frac{1}{2}$  in. b. glabrous, of a glossy pale colour. *Veins* immersed, several times forked. *Sori* medial on the lowest anterior veinlet, forming a row on each side close to the midrib. *Involucres* orbicular, large, deciduous at first cap-shaped. Hooker and Baker Syn. Fil. p. 254, *Aspidium coriaceum*, Gr. Fl. B.W.I. p. 690. *Polypodium*, Sw.

Bahamas, Jamaica.—In the former confined to a few places; in Devonshire marsh, in the latter, frequent on decaying logs in shady and open places, and in coffee fields, at 2,000–4,000 feet altitude. Guiana, Roraima, Schomburgh and im Thurm; well marked by the prostrate creeping rootstock, pale, deltoid, and very coriaceous fronds, and large sori and involucre, which turn black with age. A stiff plant but of rather pendant habit.—Cuba to Patagonia, Mascarene Isles, and through the whole south temperate zone.

15. *A. plantagineum*, GRISEB.—*Rootstock* woody, short, densely clothed to the top, with dark brown subulate scales. *Stipites* tufted about 6 in. l. laxly clothed with small narrow deciduous scales. *Fronde*s lanceolate or ovate-lanceolate. 6–9 l. 2–3 in. w. blunt and retuse at the apex where they are usually viviparous, rather suddenly or gradually narrowed and shortly decurrent on the petiole at the base; repand, margin sinuato-entire firm, chartaceous or coriaceous, nearly or quite dark green, naked; *Primary veins*, conspicuous, costate, rather wavy having copious areolæ between, with free included diverging branches the ends of which are thickened. *Sori* large, in double rows between the costular veins receptacles scaly; *Involucres* peltate orbicular early deciduous. Hooker and Baker, Syn. Fil. p. 258, Gr. Fil. B.W.I. p. 696. *Polypodium*, JACQ. *Bathmium*, FEE, *Aspidium sinuatum*, MOORE.

Guiana; in rocky ravines and water courses below the Kaieture fall, Potaro river, and in forests in water courses at Balacoon; growing on rocks, also Dominica, St. Vincent, Grenada, Trinidad. The involucre drops away so early that this was long regarded as a normal species of *Polypodium*. In Guiana it seems to invariably grow on rocks where it is often found in stream beds in very densely shady forest. Bearing in mind the deciduous character of the involucre it is easily recognised, being the only entire fronded species.—French Islands and Panama to Brazil and Peru.

16. *A. trifoliatum*, SWARTZ.—*Stipites* tufted from the crown of a short oblique or decumbent rootstock, erect, 1–1½ ft. l., dark-bright brown, channelled, naked, or fibrillose at the base. *Fronde*s ½–1½ ft. l. 5–10 in. w. membrano-chartaceous, pellucid, naked, or puberulose dark green trifid, tripartite or with 2–3 pairs of opposite, erecto-spreading, lateral pinnae of which the lowest are largest and petioled ½–1 in. l. distant from the next above 5–9 in. l. and nearly as wide at the both side lobed base, above which, they are entire, minute, lobed or pinnatifid. Superior *pinnae* equilateral, plain sinuate or lobate, acuminate, free or adnate at the base, which is usually not much enlarged, if at all; the terminal pinnae plain lobed or tri-pinnate. Main veins costate flexuose, about ½ in. apart usually stramineous, or brown, as are the costae; areolation fine, with diverging free included veinlets. *Sori* forming a single series on each side of the primary veins. *Involucres* flat, peltate orbicular repand, persistent.—Hooker and Baker, Syn. Fil. p. 258. Gr. Fl. B.W.I. p. 695.

Bahamas, Jamaica, Dominica, St. Vincent, Barbados, Grenada, Trinidad. Common at low elevations in woods and forests. Variable in cutting in the different stages of growth. It may be gathered in full fruit from the small unlobed state to that with three pair of free pinnae and a pair not free which from the basal diversions of the tri-lobed terminal pinnae are all more or less lobed or pinnatifid. In the larger fronds the basal pinnae are lobed on both sides and form a miniature of the whole frond. In the allied *Nephrodium Plumieri* they are only developed on the lower side. The rootstock becomes distinctly repent; the stipites spring from beneath round the flattened advancing crown which is ½–¾ in. in diameter.—Cuba and French Islands southward.

17. *A. meniscioides*, WILLD.—*Rootstock* creeping, erect or horizontal, stoutish and woody, freely clothed, with brown or ferruginous linear-acuminate scales. *Stipites* erect, scattered, brown channelled, clothed thickly at first with linear-acuminate scales, at length naked, 1–2 ft. l. *Fronde* pinnate, coriaceous, light or dark green, glabrous; 1–2 ft. l. 10–15 in. w. truncate at the base, with few or several pair of spreading lateral pinnae and a similar terminal one that are entire, lanceolate or oblong-lanceolate, acuminate the base, rounded and inequilateral, 5–8 in. l.  $1\frac{1}{2}$ – $2\frac{1}{2}$  in. w. the inferior very slightly stipate. Primary veins evident but not costate, running parallel to the margin at a wide angle with the costae, 2–3 li. apart; the opposite branches uniting and sending a vertical free or united branch into the areole thus formed of which there are 3–5 series. Fertile pinnae contracted or not, but generally contracted to  $\frac{1}{3}$ – $\frac{1}{2}$  the size of the barren. *Sori* copious often covering the surface, dorsal on the transverse veins forming two close rows between the primary veins and between the costae and margins, receptacles scaly. *Involucres* pellate orbicular, deciduous.—Hooker and Baker Syn. Fil. p. 257. Gr. Fl. B.W.I. p. 694. *A. confertum*, Hook. and Grev. Ic. t. 121.

Guiana; abundant every where, and often in great profusion, throughout the lower forest regions; Trinidad. A plant as well marked, as it is common in Guiana, though not without variation. This variation is presented by the fertile fronds, in which occasionally the pinnae are not at all reduced, but as a rule are contracted to one-third or half the size of the barren, the sterile and soriferous fronds are sometimes combined, the lower pinnae being barren and the upper fertile, the latter however contracted as usual. Occasionally it is found with the fronds of both kinds quite simple or only lobed, whether the contraction and non-contraction of frond marks separate varieties which are constant in the character they present, I have not been able to discover, but I am disposed to believe so, as I have never found both kinds of fronds in the same plants, much as I have seen of the species in the forest. The uncontracted form is rare in my experience, but I found several plants of it in the Mt. Ray-wa regions. In it, unlike the commoner form, the pinnae are as numerous in the fertile as the barren fronds, and their petioles are not so disproportionately elongated as in that. In both states, in the soriferous fronds, the branches springing from the transverse veinlets unite with next above but in the sterile they are free, and there is the same modifications in the transverse veinlets between the two fronds, forming in the fertile a curved or straight line and in the barren a sharp angle, as in *Menisium*.—The Brazils and Peru.

18. *A. abbreviatum*, SCHRAD.—*Rootstock* freely elongating, decumbent, or erect, about  $\frac{1}{2}$  in. thick, densely coated with spreading long subulate dark brown scales. *Stipites* apart, erect, 1–2 feet long, with a few small deciduous scales at the base, channelled, brownish. *Fronde*  $1\frac{1}{2}$ –2 ft. l. 10–15 in. w. not reduced at the base, naked or minutely furfuraceous on the ribs beneath dark-brown green, pinnate, with a distinct terminal pinnae that is sub-entire or lobed or pinnatifid at the base and twenty (less or more) to a side of distant spreading lateral ones which are 6–8 in. l.,  $\frac{1}{2}$  to nearly 2 in. w. the base petiolate and rounded or cuneate, above this, sub-entire, or cut into broadish appressed shallow lobes or more or less deeply pinnatifid, the segments about 2 li. w. and rounded or appressed at the ends; apices acuminate, the teeth rather wide. *Rachis* serrate, channelled, naked, a glossy dull brown. *Veins* very variable, lowest opposite ones uniting and

sending a veinlet toward the sinus to which those above join, there uniting with an intra-marginal vein that connects all the veinlets above in the lobes. *Sori* copious on each side of the costular ribs; *Involucres* strictly peltate, repand, dark brown; *Receptacles* fringed with scales. Hook. and Baker Syn. Fil. p. 257. Hook. Sp. Fil. p. 37, tab. 234, figs, 1, 2, 3, 6, and 7 only.

Guiana.—Common on the shady creeks on nearly all the rivers below the rapids, growing on stumps and roots of trees in the water.—Trinidad. Though the colour is almost opaque-dark the substance is quite pellucid but without the dots of the previous species. It is very variable in cutting and, consequently in its venation. The rootstock is less stout, more convolute and elongated with the stipites more apart and much finer, bristling darker scales than in its allies, and it is as often erect in growth as horizontal. In Hooker's figure quoted above it is quite characteristically represented. The pinnae are distant or sub-distant even to the top of the fronds. In fertile fronds they are sometimes as narrow as a  $\frac{1}{4}$  in. with entire nearly even edges. Usually however they are wider and more or less distinctly lobed. The veins are always areolate. The Jamaica plant given by Hooker and Grisebach for this is *Nephrodium*.—Brazil.

## GENUS XXVI.—NEPHRODIUM.—RICH.

*Sori* punctiform, orbicular, reniform, in parallel series with the final ribs. Receptacles merely thickened points, dorsal or terminal on the veins. *Involucres*, superior, the same shape as the sori, attached by the sinus, free around the edge, often only rudimentary and disappearing as the sori matures. *Veins* free or anastomosing. *Fronde*s varying from a few inches to several feet in size and from sub-entire to decomposed.

This is one of the largest genera, numbering over five hundred species in its general distribution, of which about a seventh or eighth are represented in this Flora. Some of these exist in great individual abundance and form a large proportion of the vegetation, especially of waysides and other open or half open situations, the majority being of a hardy sun-bearing character. Several species, that in every other character agree with this genus are by the entire absence of the involucre, or its rudimentary character, which prevents its being observed in any but the earliest stage of the sori, placed according to the varying veins in genera of authors in *Polypodium Phegopteris* and *Goniopteris*.

(a.) Veins all free. *Lastrea*.

Species 1—40, see also sp. 71.

(b.) Fronds bi-pinnatifid or fully bi-pinnate rarely simply pinnate, sp.

(c.) Pinnae gradually dwarfed to small auricles at the base.

Species 1—25.

(d.) Veins as a rule simple.

(e.) Species of small or medium size.

1. *N. bracypodum*.

2. *N. sanctum*.

3. *N. caribæum*.

4. *N. Nockianum*.

5. *N. negligens*.

6. *N. rigidulum*.

7. *N. Kaulfussii*.

8. *N. oligocarpum*.

9. *N. conterminum*.

Species of large and maximum size.

10. *N. nimbatum*.

11. *N. Jenmani*.

12. *N. limbation*.

13. *N. Sprengelii*.

14. *N. resino-fœtidum*.

Veins, simple or forked.

15. *N. Sherringii*.

Fronde somewhat narrowed at the base, or not, never gradually small auricles.

Veins as a rule simple.

Sp. 16—23 of small or middle size.

16. *N. crenulæum*.

17. *N. Holmei*.

18. *N. firmum*.

19. *N. trichophorum*.

20. *N. villeum*.

21. *N. Leprieurii*.  
 22. *N. subfuscum*.  
 23. *N. stipulare*.
- Veins as a rule forked.
- Species of medium size.  
 24. *N. thelypteris*.
- Sp. of large size.  
 25. *N. Filix-mas*.
- Fronds decompound.  
 Sp. 26—40.
- Final segments obtuse.
- Fronds under a span long.  
 26. *N. hirtum*.
- Fronds a span to  $1\frac{1}{2}$  ft. long.  
 27. *N. funestum*.
- Fronds  $1\frac{1}{2}$ —2 ft. long.  
 28. *N. mexicanum*.  
 29. *N. ascendens*.
- Fronds 2—5 ft. long.  
 30. *N. Grisebachii*.  
 31. *N. amplum*.  
 32. *N. villosum*.
- Final segments acute, acutely dentate, or mucronate.
- Basal pinnæ not enlarged.  
 33. *N. patulum*.  
 34. *N. nemorosum*.
- Basal pinnæ enlarged.  
 35. *N. pubescens*.  
 36. *N. ochropteroides*.  
 37. *N. denticulatum*.  
 38. *N. effusum*.  
 39. *N. macrostegium*.  
 40. *N. amplissum*.
- Veins more or less united.
- Eu-Nephrodium, *Sagenia*.  
 Sp. 41—70.
- Lower opposite veins united.
- Fronds merely lobed.  
 41. *N. incisum*.
- Fronds fully pinnate only at the base, pinnatifid above.  
 42. *N. Wrightii*.  
 43. *N. scolopendroides*.
- Fronds bi-pinnate at the base, only pinnate above this.  
 44. *N. bi-brachiatum*.
- Pinnæ sub-entire.  
 45. *N. tenebricum*.  
 46. *N. asplenioides*.

Pinnæ sub-entire or only shallowly lobed.

- 47. *N. serrulatum*.
- 48. *N. varians*.

Pinnæ uniformly but not deeply lobed.

- 49. *N. strigosum*.
- 50. *N. unitum*.
- 51. *N. calcarum*.
- 52. *N. usitatum*.
- 53. *N. venustum*.

Pinnæ moderately lobed ; fronds ovate-deltoid.

- 54. *N. sub-cuneatum*.
- 55. *N. deflexum*.
- 56. *N. deltoideum*.

Pinnæ lobed half or more than half of the depth to the costa.

- 57. *N. Grayii*.
- 58. *N. brachyodon*.
- 59. *N. jamaicensis*.
- 60. *N. bermudiana*.
- 61. *N. triste*.
- 62. *N. tetragonum*.
- 63. *N. aureoviridum*.
- 64. *N. serra*.
- 65. *N. Sloanei*.
- 66. *N. connexum*.
- 67. *N. guadalupense*.
- 68. *N. patens*.
- 69. *N. molle*.
- 70. *N. dejectum*.

Veins free or only casually unitedly near the margin.

- 71. *N. pedatum*.

Veins copiously areolated.

- 72. *N. Murrayii*.
- 73. *N. Purdiei*.

Sori small, scattered.

Sori larger, serial.

- 74. *N. macrophyllum*.
- 75. *N. cicutarium*.
- 76. *N. apiifolium*.

1. *N. brachypodium*, BAKER.—*Rootstock*, small, upright, or oblique, *Stipites* tufted dark pubescent, and fibrillose with small dark brown scales an inch more or less, l. *Fronds* pinnate 4–6 in. l.  $1\frac{1}{4}$ – $1\frac{1}{2}$  in. w. equally tapering both up and down, dark green above, paler and glandulose beneath, chartaceous, pellucid, finely pubescent, especially on the upper side finally nearly naked, but the veins and rachis which are slender and channelled nearly permanently villose. *Pinnæ* spreading, contiguous, oblong or oblong-lanceolate, blunt or acute pointed, the base broadest, auricled on both sides and shallowly cut into few rounded lobes that are barely 1 li. w. or deep, the basal pair largest, sessile 7–8 li. l. 2–3 li. w. *Veins* pellucid free, pinnate in the lobes with one or two curved simple branches to a side, the

opposite basal ones approaching contiguous at the sinus, simply forked beyond the lobes in the entire outer part of the pinna. *Sori* largest, dorsal on the lowest anterior vein, nearer the margin than rib; *involucres* ample cordate naked.—Baker in Jour. Lin. Soc.

Guiana; in Thurn n. 275 upper slope of Roraima. A plant as small as *sanctum* but with pinna less cut. If it grew larger than my specimen, then very likely the lower veins run into each other at the sinus. It resembles superficially, *Polypodium hastafolium*, Sw. of the West Indian Islands but in that the pinnae, veins and sori, are more copious, *involucres* always absent auricles sharper, beyond which the pinnae are entire.—Endemic.

2. *N. sanctum*, BAKER.—*Stipites* densely tufted, and tenaciously adherent to a fibrous erect *rootstock*, which is slightly scaly and dark-coloured at the base, slender, 1-2½ in. l., channelled. *Fronde* lanceolate, gradually reduced at the base clear light-green texture chartaceous; rachis very slender and with the costae channelled and very stramineous; 4-10 in. l., 1½-2½ in. b. *Pinnæ* inequalateral, sessile, spreading sub-distant the lower ones gradually dwindling to tiny trifoliate auricles. central longest and ¾-1½ in l., 1½-3 li. b. lobate pinnatifid, or within fully pinnate widest at the base, thence tapering to the sub-entire bluntish point; segments oblong, bluntish or rounded at the point, the larger narrowed to the base, the lowest pair of all usually the largest most of all that on the superior side ½-¾ li. b. 1-3 li. l., the inner ones apart; except usually the basal one those on the inferior side of the pinnae much reduced or nearly abortive. *Veins* pinnate in the larger segments with simple branches. *Sori* dorsal medial or nearer the edge than mid-rib; *Involucres* minute, fugacious.—Hooker and Baker, Syn. Fil. p. 267. *Polypodium* Sw. *Aspidium* Mett. Gr. Fl. B.W.I. p. 691.

*a. var. hirtum*.—*Fronde* small and compact, pinnae only lobed colour dark, rachises brown, surfaces—especially the rachises and ribs—freely pubescent.

*b. var. magnum*.—*Fronde* 10-15 in. l., 3-4 in. b. *stipites* 3-5 in. l. pinnae contiguous or apart 1½-2 in. l., 4-5 li. b., deeply pinnatifid above the fully pinnate base.

Jamaica; common on wet rocks and banks, up to 3,000 feet altitude or higher. The fronds are adherent and remain on the rootstock after they are dead till they decay away. In small states the pinnae are nearly crenate with an enlarged lobe on the upper side of the base. In all conditions one or both of the pair of basal segments are enlarged the upper most so and they increase in relative proportion as the pinnae dwindle to trifoliate segments at the base of the fronds. *A* differs only in its relatively compact habit, darker colour and pubescent surfaces.—Cuba, Guatemala.

3. *N. caribæum*, JENM.—*Stipites* densely tufted slender erect, light brown, slightly scaly at the base 2-4 in. l., slightly channelled puberulous. *Fronde* erect, bi-pinnatifid 1¼-1½ ft. l. 3-4 in. w. gradually dwindling at the base to small trifid or trifoliate segments; firm in substance pellucid dark green above, paler beneath, slightly ciliate on the ribs above, beneath glabrous or puberulous. *Rachis* light brown slender puberulous, faintly contiguous or more or less apart broadest at the base from whence they taper to the acuminate serrato-entire point; 2 in. l. 4-5 li. w. sub-equilateral uniformly



deeply pinnatifid or the very base fully pinnate, segments linear-oblong, close, except the enlarged basal pair which are nearly or quite free  $\frac{3}{4}$ -1 li. w. 2 li. l. (the basal ones 3 li.) *Veins* close, simple, *sori* medial copious. *Involucre* evident, ciliate.—Brittens Jour. Bot. Vol. 24, p. 270.

Jamaica; infrequent on Mt. Diabolo, St. Ann, gathered 2,000 feet altitude. This comes near the variety *magnum* of *N. sanctum* which it resembles a good deal, but it is a still larger plant and further marked from that by its puberulous surface, and the pinnae which are generally from one to three times their own width apart, being uniformly pinnatifid only from the pair of enlarged basal segments outwards.—Endemic.

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4. *N. Nockianum*, JENM. n. sp.—*Rootstock* small, erect; *Stipites* tufted erect very slender, brownish 4-6 in. l. channelled, puberulous, or slightly pubescent becoming naked with a few small deciduous brown scales near the base. *Fronde* erect, bi-pinnatifid 1-2 ft. l., 3-4 in. w. lanceolate or oblong-lanceolate, the base reduced gradually or abruptly, but usually not tapering; *Pinnae* spreading horizontally oblong-lanceolate acuminate, sessile, close or more or less distant, the reduced lower ones most distinct, and usually rather deflexed; central  $1\frac{1}{2}$ -2 in. l., 5-6 li. w. the acuminate point which is not sharp serrulate-entire within this, pinnatifid nearly to the costae; segments close, nearly or quite straight but rather oblique rounded and even or faintly crenulate at the point not wider at the base, 3 li. l.  $\frac{3}{4}$ -1 li. w., rachis very slender finely grayish or rusty, pubescent, channelled. *Costae* similar, other surfaces glabrous or the upper slightly ciliate, and pale beneath, above dark green. *Veins* oblique, simple or the posterior one of the segments on the inferior side of the pinnae, forked, about six to a side. *Sori* nearer the margins. *Involucres* developed, ciliate.—Brittens Jour. Bot. Vol. 24, p. 270.

Jamaica; infrequent in open places at 4,000-5,000 feet altitude. It is intermediate between *caribense* and the green pubescent state of *conterminum* and marked by its slender character, contiguous pinnae, thin translucent texture, few veins, thin and very pellucid substance, and glandulose surface.—Endemic.

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5. *N. negligens*, JENM. n. sp.—*Rootstock*, small, upright, fibrous, scurfy. *Stipites* very slender, brown naked, channelled,  $\frac{1}{2}$ - $\frac{3}{4}$  l. *Fronde* bi-pinnatifid; a span or over long 2-2 $\frac{1}{2}$  in. w. the apex tapering though diminishing lobes to the linear bluntish point, gradually reduced in the lower half to the base, membranous, dull greyish-green pellucid slightly ciliate; rachis channelled slender, fragile, gray ciliate or puberulous mid-ribs similar. *Pinnae* deeper on the upper side, free but quite sessile, the upper only adnate 1-1 $\frac{1}{4}$  in. l.,  $\frac{3}{8}$ - $\frac{5}{8}$  wide, deeply cut within to the open but sub-acute sinus, passing outwards through diminishing lobes to the broad entire point, margins even, basal lobes of the superior side  $\frac{1}{4}$ - $\frac{5}{8}$  in. l., 1-2 l. br., oblique rounded at the end. *Veins* open pinnate, simple forked in the smaller lobes, about 3-4 to a side very oblique; *Sori* small, intramarginal, involucres delicate, early fugacious.

Jamaica; infrequent on open or half shaded banks from 2,000 feet altitude upwards. Among the smaller species, it is well marked by its broad rounded parts and even uncrenated margins.

6. *N. rigidulum*, METT.—*Rootstock*, slender, elongated paleaceous. *Stipites*, tufted, 2–4 in. l., brown. *Fronde* bi-pinnatifid lanceolate 12–15 or 18 in. l., 3–4 in. w. gradually reduced both up and down, pellucid, chartaceous; *Rachis* gray puberulous, dark green ciliate on the costæ ribs and margins. *Pinnæ* contiguous, spreading in the lower ones reduced gradually to mere deltoid sub-entire segments, central 2 in. l.,  $\frac{1}{2}$  in. w. sessile acuminate pinnatifid to within  $\frac{1}{2}$  a line of the costæ. Segments linear oblong, oblique slightly broader at the connected base, point obliquely rounded, 3–4 li. l.,  $1\frac{1}{4}$  li. w. entire. *Veins* simple, oblique, 6–7 to a side. *Sori* medial; involucre ciliate around the edge.—Hooker and Baker, Syn. Fil. p. 496, 2nd ed. *Aspidium*, Mett.

Jamaica; infrequent in open situations above 3,000 feet altitude. It is near *conterminum* but much more compact, only the lower reduced and sub-entire pinnæ being separated, which however are not more apart from base to base than those above them, but being reduced and narrower they appear so. These are entire with only a pair of patent lobes at the base, and their uncut character is a conspicuous feature of the fronds.—Cuba.

7. *N. Kaulfussii*, Hook.—*Rootstock* erect. *Stipites* cæspitose 4–8 in. l., downy, slender. *Fronde* bi-pinnatifid 1–1 $\frac{1}{2}$  ft. l., 4–6 in. w. oblong-lanceolate apex acuminate apex pinnatifid the lower 2–3 pair of pinnæ reduced the lowest conspicuous, firmly chartaceous, all parts greyish and more or less pubescent. *Pinnæ* 3–4 in. l., 6–8 li. b. contiguous but apart, spreading sessile the tapering point serrato-entire, below this deeply pinnatifid; Segments very close, round pointed, or sub-acute, 3–4 li. l. from the sharp sinus,  $1\frac{1}{2}$  l. w. *Margins* even or crenulate. *Veins* simple, *Sori* medial, involucre densely ciliate, fugacious or not.—Hooker and Baker Syn. Fil. p. 268. *Aspidium*, Gr. Fl. B.W.I.

Jamaica; infrequent or rare above 2,000 or 3,000 feet altitude. There are Jamaica specimens of this in the British Museum Herbarium but none from this source at Kew. It approaches nearest to the pubescent state of *conterminum*. Grisebach unites it with *oligocarpum* and ascribes it to St. Vincent also. It has a greyish aspect something like *Jamaicense* but is less stiff and all the veins are quite free.—Grisebach says Cuba and Mexico to Chili.

8. *N. oligocarpum*, JENM.—*Rootstock* erect. *Stipites* tufted, erect, slender, 4–6 in. l., light brown puberulous, with a few pale scales at the base. *Fronde*, bi-pinnatifid lanceolate reduced both ways,  $1\frac{1}{2}$ –2 ft. l., 4–6 in. w. chartaceous light green surfaces more or less freely pubescent. *Rachis*, slender, channelled light coloured, pubescent pinnæ spreading contiguous, numerous, sessile  $2\frac{1}{2}$ – $3\frac{1}{2}$  in. l.,  $\frac{1}{3}$ – $\frac{2}{3}$  in. w. tapering to a finely acuminate serrato-entire point deeply pinnatifid, lower ones dwindling to distant small auricles; *Segments* close, oblique, connected at the slightly dilated base, linear-oblong, blunt, 1–1 $\frac{1}{4}$  li. w.  $2\frac{1}{2}$ –4 li. l. margins even or slightly crenulate and reflexed. *Veins* simple evident on the upper surface, 6–8 to a side, *sori* sub-marginal or nearer the margin than rib, *involucre* pubescent. *Aspidium*, Kth. Gr. B.W.I., J. p. 691.

Jamaica; common both in forests and open places above 3,000 feet altitude. Dominica, Guiana, (Appun n. 1138). This has much the character of *conterminum* but is not so lax in habit. It is best distinguished by its light green colour, pubescent surfaces and sori, closer to the margin than middle. The pubescence of the surface and the texture varies with the situation of growth.—Brazil.

9. *N. conterminum*, DESV.—*Rootstock*, erect. *Stipites* erect, dark, with a few deciduous scales at the base, 2–3 in. l. *Fronde* bi-pinnatifid lanceolate, or ovate-lanceolate 2–2½ ft. l., 6–9 in. w. reduced at the base to mere auricles, chartaceous, or sub-coriaceous pellucid, naked, upper, dark clear-green, under paler, pellucid. *Pinnæ* in distant or sub-distant widely spreading opposite sessile pairs, which are broadest at the base, and thence taper gradually to the attenuated long sub-entire finely acuminate point, central ones 3–5 in. l.,  $\frac{1}{2}$ – $\frac{3}{4}$  in. w. at the base, cut almost to the rachis into close oblong rounded or bluntish segments the inner ones of which are 3–5 li. l., 1–1½ li. w. the basal pair the largest and crenate or lobate; margins entire reflexed; *Veins* simple, 6–10 to a side; *Sori* intra-marginal and often partly covered by the reflexed margin; *Involucres*, as large, pale, naked; *Rachis* channelled, stiff but rather slender, bright glossy, pale or chestnut brown.—Plum. Fil. t. 47. *N. sitiorum* Jemm. Journal Botany Vol. 8, p. 261. (as var. of *N. conterminum*)

Jamaica; Frequent or infrequent on open banks skirting forests at 4,000 feet altitude, gathered in Moody's Gap where it grows with *N. nimbatum*. It possesses the bright straw or semi-chestnut colouring of *N. Jenmanii*, but is a smaller plant; *stipites* and *rachises* are slender, *pinnæ* in distant opposite narrow patent pairs, diminishing gradually in a direct line from base outwards, the long acuminate and attenuated apices usually entire, the basal segments enlarged and increasing in size as the *pinnæ* dwindle to very minute auricles on the short *stipites* the upper and longer of the two from the obliquity of the base of the *pinnæ* overlapping the rachis, the *sori* intra-marginal and the margins reflexed. There is a specimen from Wilson in Herb. Kew, assigned to *concinnum* which species however has a wide creeping rhizome.

10. *N. nimbatum*, JEMM.—*Rootstock* stoutish, erect, or suberect, the scales brown and rather small; *Stipites* few erect, 1–1½ ft. l., channelled rather sparsely deciduously scaly, chiefly at the base, greyish upwards with fine down as is also the strong channelled rachis; *Fronde* bi-pinnatifid 2–2½ ft. l., 9–12 in. w., reduced at the base to minute remote auricles. Chartaceous, pellucid, dark green above beneath paler, both surfaces including rachis and ribs greyish pubescent. *Pinnæ* numerous, distant alternate spreading, often horizontally sessile, central ones 5–8 in. l., about 1 in. w. the apex long, acuminate and serrate entire, cut down  $\frac{3}{4}$ – $\frac{5}{6}$  to the costæ into flat rounded straight or subfalcate segments 4–6 li. l. from the open acute or rounded sinus and 1½–2 li. w. with their own width between them at the margins entire. *Veins* simple, 8–10 to a side. *Sori* small medial. *Involucres* pale minute ciliate and fringed with setæ, fugacious.

Jamaica; abundant in places on banks skirting forests at 4,000 ft. altitude; gathered at Moody's Gap. It is clothed throughout with a fine microscopic grey puberulæ. The scale of the rootstock ascend the greater length of the *stipites* scattered and sparsely but are soon deciduous. The *pinnæ* are remote and spread at a wide angle, dwindling at the base to minute segments. The upper ones are broadest at the base, but the lower are not, all are sessile. They are cut to within 1–1½ l. to the costæ and the pinnules are rather dilated at the confluent bases. The texture is thin, but hard when dry. The *sori* are small and the *involucres* setose-fringed.—Venezuela.

11. *N. Jenmanii*, BAKER.—*Rootstock* stout, erect often several inches high. *Stipites* cæspitose, erect, strong, 3–8 in. l. channelled with a few deciduous dark-brown scales at the base. *Fronde* erect,

bi-pinnatifid ovate-lanceolate 2-4 ft. l.,  $\frac{3}{4}$ -1 $\frac{1}{2}$  ft. w. gradually reduced from the middle to both apex and base; chartaceous, pellucid-dotted, surfaces naked. the costæ above deciduously ciliate, dark clear-green on the upper side, the under paler; *Rachis* strong, channelled sub-angular, bright-pale or chesnut brown. *Pinnæ* opposite or alternate, contiguous or sub-distant below, very numerous spreading at a wide angle, 6-9 in. l., 1-1 $\frac{1}{2}$  in. w., sessile, the apex finely serrato-acuminate, pinnatifid to within a line of the costæ, the lower ones very gradually reduced to less than an inch l. Segments very numerous, flat nearly straight, rounded  $\frac{1}{2}$ - $\frac{3}{4}$  in. l., 1 $\frac{1}{2}$ -2 li. b. above the rather dilated confluent bases, close or with a more or less open sinus between them basal pair enlarged and often lobed or pinnatifid in the larger fronds. *Margins* entire or crenated; pale or chesnut brown. *Veins* simple, 8-12 to a side. *Sori* copious medial; involucre as large, pale, naked. — Journal Botany, Vol. V. N.S. p. 263.

Jamaica; at 5,000-6,000 feet altitude near streams and in wet places, gathered on the Government Cinchona Plantation where it is abundant and at Portland Gap. A fine robust species with usually very short stipites well distinguished by its dark clear colouring and flat broad segments with medial sori. The veins and ribs of live plants are pellucid. The habit is that of *Filix-mas* and is stiff shuttlecock-like. The flat and broader segments distinguish it from any of the following.—Endemic.

12. *N. limbatum*, DESV.—*Rootstock* erect, scaly; *Stipites* erect, 4-6 in. l., dark and deciduously scaly at the base; *Fronde* bi-pinnatifid 1 $\frac{1}{2}$ -2 $\frac{1}{2}$  ft. l. 6-8 or 10 in. w. chartaceous, naked, or puberulous-glandulose bright green, paler beneath, reduced each way, gradually at the base to minute segments or mere glands. *Pinnæ* numerous, spreading nearly horizontally, sessile, with a gland at the base beneath; when they are broadest thence tapering to the acuminate-serrato—entire point,  $\frac{1}{2}$ - $\frac{3}{4}$  in. b. 3-5 in. l. pinnatifid nearly to the costæ *Segments* close, linear-oblong, blunt, or rounded, connected but not, or barely, dilated at the bases, 1 $\frac{1}{2}$  li. b. 3-4 li. l.; *Margins* crenato-entire or the basal pair, which are largest, serrate; *Rachis* stramineous, naked, *Veins* simple, 8-10 to a side. *Sori* sub-marginal exposed or half covered by the reflexed edge; involucre, pale. Hooker and Baker, Syn. Fil. p. 269. *Aspidium*, Swartz. Gr. Fl., B.W.I., p. 692. *Amauropelta*, Kze.

Jamaica; infrequent at 4000-5000 ft. altitude resembling somewhat some of the forms of the preceding, but distinguished by the distinctly marginal sori. In my specimen the pinnæ are alternate, and the rachis is rounded and muricate beneath. The segments are nearly an equal width from base to apex. And the margins are sub-crenulate and reflexed on the sori. Porto Rico, St. Kitts, Guadeloupe and St. Vincent,

13. *N. Sprengelii* Hook.—*Rootstock* erect, stoutish, often a span high. *Stipites* strong caespitose, stiffly erect, 4-8 in. l., channelled, scaly, and dark coloured at the base. *Fronde* bi-pinnatifid erect, 1 $\frac{1}{2}$ -4 ft. l., 6-12 in. w. chartaceous, naked or slightly glandulose, bright green, reduced gradually each way at the base to distant minute segments or mere glands, which reach nearly down the stipites. *Pinnæ* contiguous above, sub-distant or distant below, usually opposite numerous, spreading nearly horizontally, bearing a gland at the base, beneath sessile broadest at the base and tapering gradually

outwards to the finely acuminate serrato-entire point. 4-7 in. l.,  $\frac{1}{2}$  nearly 1 in. w. cut almost to the costæ into close spreading bluntish or acute subfalcate segments which are 4-6 li. l. and 1- $1\frac{1}{2}$  li. w. at the connected but slightly dilated bases; the basal pair usually the largest, the edges even and reflexed. *Rachis* strong, subangular stramineous, naked or with a few scattered fibrillæ toward the base; costæ and ribs puberulous. *Veins* simple, 12-15 to a side close; *Sori* medial or nearer the margins; involucre pale naked, fugacious.—*Aspidium*, KLF.

*A. var. rivulorum.* *Fronds* smaller, segments not reflexed at the edges. *Polypodium rivulorum* RADD, Plant, Brazil, t. 35.

Jamaica; common on open banks by wayside and in marshy places, from the lowlands up to 4,000-5,000 ft. altitude.

Dominica, St. Vincent, Grenada and Trinidad, and probably right through the West Indies, but the species have been much confounded. *Aspidium strigosum*, Fée, Fil. ant. t. 22, fig. A.

*A. conterminum* var. *strigosum* of North American Botanists is probably this exactly, and *A. Berterianum*, Fée, Fil., Ant., p. 22, fig. 1, seems to be the same by the figure with like resinuous glands beneath. It has the upright habit especially the larger lowland state, of *resinofoetidum* but is less stiff and the margins are less decidedly reflexed over the sori. The sori are really medial, but the folding back of the edges of the margins make them appear nearer thereto than to the mid-rid, except in *A.* the smaller mountain state. *Aspidium Rivoiræ* and *A. consanguineum* of Fée seems to be this or near to it.—Florida, Porto Rico, Martinique, Guadeloupe, West Indies and Columbia.

14. *N. resino-fœtidum*, HOOK.—*Rootstock*, short, erect, often a span or more high. *Stipites* cæspitose strong, erect, numerous, 1-2 ft. l., channelled, dark-coloured fibrillose and dirty-paleaceous increasingly downwards and thickly coated in growth with mucous slime. *Fronds* erect, bi-pinnatifid 2-4 ft. l.,  $\frac{3}{4}$ - $1\frac{1}{2}$  ft. w. subcoriaceous viscid throughout but naked, dark-green above, more or less suddenly reduced at the base, passing through distant dwindling auricles into mere muricate glands which often reach nearly to the base of the stipites. *Pinna* close above, more or less distant below, numerous spreading nearly horizontally opposite or alternate 5-9 in. l.  $\frac{3}{4}$ -1 in. w. with a muricate gland at the base beneath, sessile and tapering outwards to the finely acuminate and serrato-entire point; cut nearly to the costæ into close blunt or acute entire sub-falcate segments with involute edges which enclose the sori 4-6 li. l., 1- $1\frac{1}{2}$  l. w. at the rather dilated and connected bases; lowest pair largest but also entire. *Rachis* strong sub-angular and channelled stramineous, puberulous with a few scattered fibrillæ bel w. *Veins* pellucid simple close 12-16 to a side. *Sori* copious nearer the involute margin which covers it; involucre pale naked, fugacious.—Hooker and Baker Syn. Fil. p. 269.

Jamaica; infrequent on banks and in often wet open places from 4,000-5,000 feet altitude. A large coarse species resembling *Sprengelii* in outline and habit but more rigid, and distinguished by the revolute edges, densely viscid fronds and numerous stipites, and condex. In a growing state it has a delicious peach perfume. The segments are really blunt or rounded, but the edges being folded they appear acute pointed. The sori are at length confluent, and under the inflexed margins the segments resemble some of the *Cheilantheæ*. The pinnae taper very gradually from the base to the point.—Ecuador and Bolivia.

15. *N. Sherringii*, JENMAN.—*Rootstock*, short, erect, often a span or more high. *Stipites* many, caespitose erect 4–10 in. l., strong fibrillose, dark and pallaceous at the base. *Fronde* erect, ample, bi-pinnatifid 3–4½ ft. l., 1–1¾ ft. w. reduced at the base to distant segments or mere glands. *Pinnæ* very numerous distant at the base, contiguous above, spreading nearly horizontally, opposite or contiguously alternate, 6–10 in. l., 1½–2½ in. b. sessile with a strong gland at the base, beneath pinnatifid almost to the costæ; Segments linear ¾–1¼ in. l., 1½ li. w., acute or bluntish crenate serrate, lobed or even, pinnatifid with a rounded sinus and their own width more or less, between them, slightly dilated at the connected bases. *Rachis* strong, subangular, channelled glandulose-puberulous stramineous or brown. *Costæ* stramineous channelled finely ciliate above. *Veins* pellucid, simple, forked or pinnate in the pinnatifid pinnulæ, 16–20 (or 25) to a side. *Sori* medial; involucre pale, puberulous-glandulose, enclosing the sori at first.—*Journal Botany*, vol. 8., p. 261.

Jamaica; common in open places among the Port Royal and Portland mountains at 2,000–4,000 ft. altitude. This is probably a variety of *Sprengelii* tending to a tripinnate state. The two plants are however sufficiently distinct. The pinnæ do not taper from the base outwards as in that species but widen rather above the base; It rivals even *Jenmani* and *resinofadidum* in size, and the plants from large masses several growing together standing 4–5 feet high, the segments are generally of irregular length and the space between them varies.—Endemic.

16. *N. crenulæum* JENM.—*Stipites* tufted, slender, erect, channelled dark at the base with a few small deciduous brown scales and distant slight warts, upwards brown or dark stramineous and naked. *Fronde* ovate or oblong-lanceolate 9–12 in. l. 4–5 in. w. erect, bipinnatifid narrowed somewhat at the base, the apex pinnatifid passing to the serrulate acuminate point, membranous and pellucid in substance, dark green glabrous beneath, slightly ciliate above especially on the ribs. *Rachises* very slender coloured like the stipites channelled glabrous or slightly ciliate and rather glossy. *Pinnæ* spreading lax, their own width or more between them, the inferior sub-distant or distant 2–2½ in. l., or over, ⅓–½ in. w. the lowest pair half as long, sessile, the inferior ones hardly so, and somewhat narrowed at the base, those above slightly enlarged or not, these of a uniform width outwards, narrowing thence to the acuminate serrate-entire sharp point, deeply cut into oblong blunt, distinctly crenulate segments which are 1¼–1½ li. w., 2–2½ li. deep with a close or rather open sinus between to which the marginal crenatures nearly reach. *Veins* simple 5–6 to a side, one of the lowest opposite pair entering the sinus, the other above it. *Sori* inter-marginal, involucre cordate, rather ciliate.

Jamaica; 2,000–3,000 ft. altitude. A very delicate plant both in substance and frame-work with few open curved veins that are conspicuous in the thin pellucid parenchyma and rather thickened at the end the outer ones especially excurrent, thus forming the crenatures of the margin. The slender habit, thin dark substance in which the veins are conspicuous and crenate margins, distinguish it at a glance.—Endemic.

17. *N. Holmei*, BAKER.—*Stipites* ½ ft. long, substramineous, naked, glabrous. *Fronde* oblong-lanceolate nearly bi-pinnate, membranous, scales less and a foot long, densely pilose on the rachis of

the pinnae and costa of the pinnules. *Pinnæ* multijugate, sessile lanceolate,  $2\frac{1}{2}$ -3 in. l.,  $\frac{5}{8}$ - $\frac{3}{4}$  in. b. cut down nearly to the costa into entire contiguous lanceolate pinnules  $\frac{1}{8}$  in. broad. Veinlets distinct erecto-patent simple 8-9 jugate. *Sori*, few medial on the veins. Indusium minute hispid fugacious.

Hab. Montserrat; Revd. H. R. Holme near *N. chrysolobum*. This I have not seen, and Mr. Baker has kindly supplied the description.—Endemic.

18. *N. firmum*. BAKER.—*Rootstock*, free creeping, hardy thicker than a quill, thickly beset with the bases of former stipites, the advancing part densely clothed with narrow dark brown scales. *Stipites* scattered but contiguous, erect, 8-12 in. l., with a few deciduous scales at the base, brownish glossy channelled. *Fronde*s lanceolate or ovate-lanceolate 9-12 in. l., 4-6 in. w., very little narrowed at the base; naked, dark-green above and glossy, underside paler, coriaceous. *Rachis* and costæ brownish glossy puberulous above the latter rather wavy. *Pinnæ* sessile spreading nearly horizontally, sub-distant below the rather shorter basal ones often deflexed,  $2\frac{1}{2}$ - $3\frac{1}{2}$  in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. w. acuminate, deeply pinnatifid or fully pinnate at the very base. Segments close  $\frac{1}{4}$ - $\frac{1}{2}$  in. l. 1- $1\frac{1}{2}$  in. w., oblong, bluntish, the barely crenulate edge slightly reflexed. *Veins* very oblique simple or forked pellucid and raised above obsolete beneath. *Sori* small, dorsal near the margin, involucre small fugacious sporangia ciliate. *Journal Botany*, Vol. 8, p. 260.

Jamaica; common on the slopes of the Blue Mountain peak at 2,000 feet altitude. Well distinguished by its free creeping slender rhizome stiff hard texture and ciliate capsules. Most of the fronds are barren so that the plants, growing among the undergrowth and bushwood of the forest resemble young tree ferns. It is a much more coriaceous plant than *conterminum* or its allies which have erect rootstocks and the fronds are less reduced at the base. The stipites run in the direction of the rootstock at the bottom and then curve upwards.—Endemic.

19. *N. tricophorum*, BAKER.—*Rootstock* slender, prostrate, repent. *Stipites* scattered, erect, slender channelled, gray pubescent, or at length naked 6-9 in. l. *Fronde*s erect, chartaceous pellucid gray green, freely pubescent especially on the costæ and slender rachis 1- $1\frac{1}{2}$  ft. l., 5-8 in. w. ovate or ovate-lanceolate bi-pinnatifid, very little reduced at the base, the apex pinnatifid, passing into very acuminate point. *Pinnæ* spreading, 15-20 to a side, sessile, more or less apart, the lower ones sub-distant, 3-4 in. l., 7-9 li. w. acuminate, the lowest pair little or much reduced, cut to within 1- $1\frac{1}{2}$  li. of the costæ into acute or obliquely rounded and pointed deltoid elongate oblique segments 3-4 li. l., 2 li. br. with a sharp sinus between the broad basis from which a pellucid line runs to the costæ. Margins entire. *Veins* simple, spreading 6-8 to a side, the lower pair excurrent just at or above the sinus, but never meeting. *Sori* medial: involucre at length turning brown, ciliate.—Hooker and Baker. *Syn. Fil. p.* 265. *Aspidium* Fée *Fil. Ant. t.* 23 f. 2.

St. Lucia and Grenada; gathered respectively by Gray and Elliott. A smaller and much more slender plant than *patens* which in general aspect it resembles, densely coated on the slender rachis and costæ with gray spreading tomentum, that finally turns somewhat brown. It also resembles, especially in its slender stipites and rachis, and coating, *Polypodium pubescens*,

Radd, but the latter has an erect rootstock. The pinnæ are not enlarged at the base and only narrow in the outer third to the subentuse acuminate point only two or three of the lower pairs are shortened. *Aspidium asperulum* Fée Fil., Ant. t. 23. f. 1 is near this.—Guadeloupe.

20. *N. velleum*, BAKER.—*Rootstock*, stout, erect, or sub-erect, densely clothed with long narrowly-linear very dark-brown scales. *Stipites* caespitose erect, 4–8 in. l., strong clothed at the base, like the rootstock, and upwards densely as also the rachis and costæ with matted and fibrillose fulvous or reddish vestiture. *Fronde*s  $1\frac{1}{2}$ –2 ft. l. 5–9 in. w. not or hardly narrowed at the base, oblong-lanceolate the barren usually broader in the parts than the fertile, thinly chartaceous pellucid, upper surface dark or bright green, naked, under pale grayish scaly on the ribs. *Pinnæ* spreading, distant or sub-distant below and stipitate, sometimes throughout oblong-lanceolate widest at the base and tapering to the point which is usually bluntish 3–4 in. l.,  $\frac{3}{4}$ –1 in. w. pinnatifid almost to the costæ. Segments oblong, sub-falcate, blunt or rounded, 3–7 li. l., 1–2 li. b., contiguous or with an open space and rounded sinus between nearly or quite their own width, adnate decurrent and slightly confluent at the base; margins entire, crenate, or dentate. *Veins* sub-distant 6–8 to a side simple or forked. *Sori* copious, medial or nearer the mid-rib. involucre small scaly fugaceous. Hook. Sp. Fil. Vol. 4, t. 246. *Aspidium aureovestitum*, Gr.

Jamaica; common in forests on the Manchester mountains at 2,000 feet altitude. A very clearly marked plant not resembling closely any other here included. By the dense appressed vestiture of small or minute pale scales which clothes the petiole rachis and ribs quite concealing the surface and shaggy dark coloured coating of the rootstock in which the scales are 1 in. long and less than a line wide, it may be recognised at sight, it is very near *N. Ctenites* Baker, of Brazil and Cuba.

21. *N. Leprieurii*, Hook.—*Rootstock* erect. *Stipites* caespitose, erect,  $1\frac{1}{2}$ –3 ft. l., channelled densely villose, scaly, only at the very base. *Fronde*s oblong, lanceolate acuminate  $1\frac{1}{2}$ –3 ft. l.  $\frac{3}{4}$ –1 ft. w., bi-pinnatifid firm, underside very minutely glandulose, rather dark rachis and costæ densely villose and the edge and ribs as well beneath. *Pinnæ* spreading in opposite pairs or alternate, contiguous or apart, the lower ones rather distant and deflexed lower pair not reduced, all sessile with a projecting gland at the base beneath, those of the lower half 4–6 in. l., all terminating in a narrow crenato-entire point below this deeply cut into close blunt entire lobes 5–6 li. l.,  $\frac{1}{8}$  in. w., the lowest pair or more of which are decidedly reduced. *Veins* simple, close, lowest pair terminating just above the acute sinus, 8–10 or 12 to a side, pale and conspicuous. *Sori* copious, extending in a double row from the base to the apex of each lobe, rather nearer the margin than rib; involucre ample pale, villose; Hooker and Baker. Syn. Fil. p. 266.

Guiana; frequent in forests of the higher and distant interior, gathered at Ahinabowa on, the Potaro above the Kaietuer falls, and by Mr. im Thurn at Roraima and also in Cayenne by Leprieur. Though presenting no very striking character it is a well individualised plant, of stiff erect habit, the barren fronds being external on stipites only half the length of those of the soriferous fronds. Its densely villose coating very copious sori and ample involucre pale, straw coloured veins, and sudden dwarfing of the basal lobes of the pinnæ mark it.—Andes of Peru.



22. *N. subfuscum*, BAKER.—*Stipites* 1-2 ft. l. light brown or straw-coloured puberulous. *Fronde*s 2-3 ft. l. bi-pinnatifid 1-1½ ft. w. *Rachis* like stipe, channelled. *Pinnæ* spreading contiguous above, sub-distant below sessile and broadest at the base, then tapering outwards to a very acuminate entire point, 6-7 in. l. nearly 1¼ in. w. cut about  $\frac{3}{4}$  to the costæ into oblong straight or slightly oblique rounded close lobes, 2-2½ l. wide  $\frac{1}{3}$  in. deep to the sharp sinus; outer margin very faintly crenate or entire. Thin but firm in substance the surfaces slightly ciliate puberulous on the ribs and costæ. *Veins* 7-10 to a side oblique simple, the lowest pair entering just above the sinus. *Sori* medial, all the veins fertile: involucre slightly ciliate fugaceous. Hooker & Baker, Syn. Fil. p. 267. Fl. Bras., p. 471.

Guiana; collected by Leprieur in Cayenne. There is but one specimen of this at Kew which is not complete, the lower portion having been cut away. If only the stipe is wanting, the base of the frond is not reduced. Both surfaces are slightly ciliate, but the ribs costæ and *Rachis* most so. It is intermediate between—*Leprieurii* and *stipulare*.—Endemic.

23. *N. stipulare*, MOORE.—*Rootstock* erect, stout or stoutish, often several times high scaly. *Stipites* cæspitose, erect, 1-2 ft. l. pale coloured, deciduously paleaceous at the base, strong sub-angular not channelled. *Fronde*s erect, 1½-4 ft. l.,  $\frac{1}{2}$ -1½ ft. w., papyraceous in texture, more or less pubescent, throughout, light green. *Rachis* strong, sub-angular not channelled naked or pubescent. *Pinnæ* very numerous, sessile, spreading contiguous the lower 1-3 pairs usually somewhat reduced and deflexed, central ones 5-9 in. l.  $\frac{2}{3}$ -1 in. w., tapering from the base to the acuminate and serrato entire point, cut down  $\frac{3}{4}$ - $\frac{5}{6}$  to the costæ into close sub-falcate oblong, flat blunt entire segments 1½-2 li. b. the costal pair enlarged often much the inferior of the two, usually the larger, entire or more or less incised or pinnatifid. *Veins* simple, 8-10 to a side lowest pair free at or running together to the sinus. *Sori* medial, pale or dark coloured eventually. Involucre as large, pale, ciliate. *N. patens*, J. Smith, *Aspidium*, Willd. Plun. Fil. t. 23.

*A. var. macrourum*, stipites 2 ft. l., fronds 2½ ft. l.,  $\frac{3}{4}$ -1 ft. w., segments narrower, a line or less w. more falcate, the inferior pair more or less pinnatifid, surface less ciliate, texture firmer: rachis and stipite darker, lowest veins quite free.—Pl. Fil. t. 23. *Aspidium*, Willd.

*B. var. pseudo-patens*, Jenman. *Stipites* slender, 9-12 in. l. *Fronde*s ovate deltoid widest below the middle, 9-12 or 15 in. l., 6-9 in w. *Pinnæ* linear, serrato-acuminate 4-6 l. w.; Segments falcate acute  $\frac{3}{4}$ -1 l. w. lowest veins quite free.

Jamaica; common in open and half open places often growing among bushes in remote places from the lower hills up to 5,000 feet altitude. The plant described as the type is much larger than *patens* from which it is distinguished definitely by the stout erect rootstock, but there are less robust forms, a foot or two high, possessing the same kind of upright caudex that must be associated with it. The latter comes near *Molle* but have not the simple vein running to the sinus which is characteristic of that species. The venation is variable and some of the forms might be placed in the next division. *A* is a large plant not very common, well marked by its narrower segments, with (when dry) reflexed edges. *B*, grows on wet rocks by the sides of rivers in Jamaica. (Ugly river, St. Mary). It is marked by the much smaller spreading fronds.

this ovate-deltoid shape, and the narrow pinnæ resembling those of *Serra*. It is common in cultivation in Europe under the name of *patens*. The enlarged basal pinnule vary in the different forms, in the most developed state they are 1 in. l. and  $\frac{1}{2}$  in. w. and deeply pinnatifid. In most cases however they are much smaller and entire.—West Indies, Brazil, and Peru.

24. *N. thelypteris*, DESV.—*Rootstock* slender, free, creeping. *Stipites* erect, a span to a foot long, slender, naked, channelled, light brown, or stramineous. *Fronde* erect oblong-lanceolate, 1–1 $\frac{1}{2}$  ft. l., 3–5 in. w. chartaceous pellucid glabrous, light or dark green, bi-pinnatifid. *Rachis* slender, channelled stramineous. *Pinnæ* spreading apart numerous, sessile or sometimes barely so, lower ones not reduced, or the lowest one slightly, 1 $\frac{1}{2}$ –2 $\frac{1}{2}$  in. l., about  $\frac{1}{2}$  in. w. almost to the costæ within, less so in the outer part passing from lobes to dentations into the acute entire point. Segments contiguous spreading the lowest pair usually somewhat enlarged, plain or very slightly crenate, the fertile sometimes reflexed, the end broadly acute or rounded 2–3 or 4 li. l., 1 $\frac{1}{2}$  li. b., the sinus close or rounded and open. *Veins* forked or simple. *Sori* medial, one to each vein or branch; involucre manifest. Hooker and Baker, Syn. Fil. p. 271. Hook. Brit. Icon. t. 13.

Bermuda; found only on the North side of Pembroke marsh. The sori vary in their situation from medial to nearer the edge on the mid vein. The veiny looking surface is a good character of the plant. General in the Northern latitudes, occurring also in South Africa and New Zealand.

25. *N. Filix-mas*, RICH.—*Rootstock* stout, erect, densely paleaceous on the crown. *Stipites* densely cæspitose strong erect, 4–6 or 8 in. l. densely clotted like the rootstock. *Fronde* erect, lanceolate or ovate-lanceolate, narrowed downwards 1 $\frac{1}{2}$ –2 $\frac{1}{2}$  ft. l. 8–12 in. w. bi-pinnatifid firmly chartaceous, globrous bright-green above paler and lurid green beneath. *Pinnæ* close, spreading horizontally, the reduced lower ones only a little apart, and deflexed, sessile and broadest at the base; tapering thence to the finely serrato-acuminate point, 4–7 in. l.  $\frac{1}{3}$ –1 in. w. or over, lower ones 2–3 in. l. pinnatifid almost to the costæ; segments straight, oblong or linear-oblong rounded, close, with the base not dilated and the sinus sharp, 1 $\frac{1}{2}$ –2 $\frac{1}{2}$  li. w. 4–6 li. l. even or slightly crenate. *Rachis*, strong sub-angular, stramineous, densely clothed with ferruginous fibrillose scales, as are also the costæ at the base. *Veins* once or twice forked, curved. *Sori* 1—serial on the anterior venules, nearly medial between ribs and margins. Involucre ample, converse, naked.—Hooker & Baker, Syn. Fil.; p. 272.

Jamaica;—infrequent on the highest ridges and peak of the Blue Mountain at 8,000 feet altitude.

This is a very interesting discovery, was made by Sir D. Morris, K.C.M.G., while in charge of the Botanical Department, Jamaica, 1879–86. Though common on the mainland from Greenland to Peru, and often of late years sought for in Jamaica, it had not before been found in the West Indies. The form is identically the Tropical American one, which is distinguished by the very dense bright-shaggy coating of the rachis very close tapering horizontal pinnæ and close equal ended entire or finely crenate segments, though the fronds are gradually reduced below the lower pinnæ are 2–3 in. long with some variation of form in different countries, this species is widely spread in Europe, Asia, Africa and America.

26. *N. hirtum*, Hook.—*Rootstock* short, upright or oblique, very densely clothed with long linear undulate dark brown scales. *Stipites* caespitose erect, or somewhat spreading, 3–9 in. l., clothed at the base like the rootstock copiously fibrillose and glandulose upwards. *Fronde* deltoid or oblong-deltoid 4–8 in. l., 3–5 in. br. tri-quad pinnatifid,\* thin, ash-green glandulose, slightly ciliate or naked. *Rachis* costæ and costulæ more or less freely clothed like the stipites. *Pinnæ* spreading lowest sub-deltoid and deeper on the inferior side, petiolate central oblong, stipitate or sessile rather blunt pointed,  $\frac{1}{2}$ –1 in. w.,  $1\frac{1}{2}$ –3 in. l., those above gradually reduced, ultimate segments oblong, blunt, the outer ones at least, adnate and decurrent serrate with oppressed thickish teeth lobed or decurrent at the base, deeply pinnatifid, the lobes a line or less w., and 1–2 li. deep. *Veins* pinnate in the larger lobes. *Sori* terminal on the short branches, medial. *Involucres* brownish, disappearing with age. Hooker and Baker, Syn. Fil. p. 278.—*Aspidium* SWARTZ. Gr. Fl. B. W. I. p. 691. *Polypodium crystallinum*, Kze.

Jamaica; common in forests in and among calcareous rocks from 2,000–5,000 ft. altitude. Generally distributed through the colony. Variable in size; mostly found small, with spreading deltoid or elongate deltoid fronds 3–5 in. long well distinguished by its small size, copious vestiture glandulose, surface and pale colour. The larger stage which is erect in habit, plentiful in the forest above Moody's Gap, on the ridge between the parishes of St. Andrew and Portland.—Cuba, Guatemala, and West Tropical Africa.

27. *N. funestum*, Hook.—*Rootstock* short creeping, pencil thick, densely coated with brown rather fibrillose scales. *Stipites* approximately erect, 1– $1\frac{1}{2}$  ft. l., dark-brown with a few fibrillose deciduous scales at the base, naked or puberulous above, channelled. *Fronde* brown, firm but not stiff; rachis and costæ puberulous, and fibrillose, the rest of the surface naked, 1– $1\frac{1}{3}$  ft. l. tri-quadripinnatifid; lowest pair of pinnæ much the largest, distant from the next pair and most developed on the under side  $\frac{2}{3}$  to 1 ft. l., the lowest pinna on the lower side being 4–7 in. l. and  $1\frac{1}{2}$ –2 in. w. the opposite one on the superior side being only  $\frac{1}{3}$  as large, pinnæ of the rest of the frond equilateral and gradually reduced to the lobate-entire and acuminate apex; final lobes sub-entire or lobate  $\frac{1}{2}$ – $\frac{3}{4}$  in. l.  $\frac{1}{4}$ – $\frac{1}{2}$  in. w. blunt, narrowed and decurrent at the base; *Veins* forked; *Sori* medial usually on the superior branch in the lobes near the margin; involucres rather small and eventually deciduous.—Hook. Sp. Fil. Vol. 4, t. 259. *N. sub-quinquefidum*, Hooker and Baker, Syn. Fil. p. 281 in part.

Trinidad, and Guiana; common in forests. This is very abundant in Guiana, scattered over the floor of the forest of most of the alluvial region, and extending into the interior of the country to the higher sand shore plateaux, preferring well drained ground as a rule. It differs from the sub-species by the basal pair of pinnæ being so much enlarged as to give the fronds a tripartite appearance.—Portorico, Guadeloupe, to Brazil.

\* The measurements given of the pinnæ, pinnulæ, &c., in this division do not apply to the lowest pair which are deeper and more compound on the under side than the rest.

28. *N. mexicanum*, Hook.—*Stipites* 1–1½ ft. l., erect spreading pubescent, with scattered minute scales above the more paleaceous base. *Fronde* oblong, acuminate bi-tripinnate 1½–2 ft. l., 9–12 in. w. chartaceous light green, slightly ciliate on the surface, Rachis, costæ and ribs finely pubescent and sprinkled with minute scales. Lowest pair of pinnae largest and deeper on the under side, those above these equilateral spreading. Pinnulae adnate at the base, or the lower ones quite free, cut more or less deeply on both sides into oblong round-ended segments. 1–2 li. w., 2–3 li. l., Veinlets simple, not reaching the edge. *Sori* medial. Involucres deciduous or abortive.—Hooker, Sp. Fil. Vol. 4, p. 138 to 267—Gr., Fl., B.W.I., p. 690,

Jamaica; there are two sheets of this collected by Wilson, but without locality in the Kew Herbarium, which are marked in Grisebach's hand, as a variety of *N. villosum*, of other Jamaica species, it comes nearest *Aspidium Christianæ* but differs by deeper and more uniform cutting of the pinnules (lowest pair of pinnae largest) the peculiar vestiture and the reniform sori.—Mexico Southward.

29. *N. ascendens*, JENMAN.—*Rootstock* strong ½–1 in. l. thick, densely scaly, wide creeping on the ground or up the trunk of trees. *Stipites* scattered, strong, 1–9 in l., naked except at the very base. *Fronde* deltoid dimorphous; the barren 2–2½ ft. l. and about the same wide, tri-quadr-pinnate, coriaceous; naked dark green glossy; rachis and costæ light or dark brown, the latter pubescent down the channelled face broadest at the base and thence tapering to the apex. *Pinnae* petiolate spreading, basal pair largest and deeper on the inferior side 12–15 in. l., 7–10 in. w. acuminate; pinnulae much the same shape, stipitate ultimate segments oblong, pointed cuneate, or obliquely-cuneate at the base, lobate or only dentate. *Veins* simple, or forked, entering the marginal teeth pellucid. Fertile fronds the same shape, but smaller, these segments contracted, sinuate 1–1½ li. w., the sori bi-serial, occupying the entire lobes of the under surface; involucres at first, sub-orbicular ultimately reniform, dark brown persistent. Hooker and Baker, Syn., Fil. p. 255 Gr. Fl. B. W. I. p. 690.—*Dicksonia apiifolia*, Heward.

Jamaica; common in the parishes of Manchester and St. Ann's at 2,000 ft. altitude, growing on the skirts of forests and often extending acre after acre and ascending trees several feet from the ground after the manner of *Polybotrya* and *Stenochlæna*; it has as much claim to be placed in the next genus as here. In the fertile fronds all the membrane is suppressed except a narrow sinuate wing to the ribs on which the sori are borne, terminal on the short spur-like veins. Sometimes the fronds partake of the character of both forms. The sori are very abundant and the dark-brown involucres remain till the fronds perish.—Endemic.

30. *N. Grisebachii*, BAKER.—*Rootstock*, stout, usually decumbent, densely clothed with rusty brown linear-subulate scales, that are ½–1 in. l. and less than a line w. *Stipites* caespitose dark-coloured, 1½–2½ ft. l, hardly channelled clothed at the base in a tuft like the rootstock, above this with dark squarrose criniferous scales 2–4 li. l. *Fronde* 2½–3½ ft. l., 2–3 ft. w. tri-quadr-pinnate, thinly chartaceous or membranous, rather light, vivid green; rachis, costæ and costula somewhat fibrillose scaly and puberulous, glandulose, surfaces otherwise naked. *Pinnae* spreading petiolate, all but the lowest pair,

which are enlarged on the inferior side; oblong-acuminate and 1-1½ ft. l., 4-6 in. w. Pinnulæ contiguous, very numerous, the lower ones slightly stipate, oblong-acuminate 2-3½ in. l., ¾-1 in. w., deeply pinnatifid but (except those of the enlarged basal pinnæ) not fully pinnate; tertiary segments oblong, blunt, ½-¾ in. l., 1½-2½ li. w. entire serrulate toothed or more or less lobed; the teeth sharp, ½-¾ li. w. and deep. *Veins* pinnate, branches simple or forked. *Sori* dorsal rather nearer the mid-rib than margin; involucre pale at first covering the sori but fugacious. Hook. and Baker Syn. Fil. p. 285.

Jamaica; frequent in damp forests from 3,000 to upwards of 5,000 feet altitude. This is more delicate in texture than any other in the group. In some of the smaller conditions of its growth the basal pinnæ are very little if at all enlarged. The dark petioles and rachises have a bluish tinge when growing. It is characterised by the thin substance, vivid colour, the pinnulæ of all but the lowest pinnæ being simply pinnatifid to the base; the sharp teeth, the outer third or fourth part of every pinnæ being usually (though not always) devoid of sori and the two kinds of scales which form the vestiture of the pinnæ being nearly uniformly barren, is a feature peculiar to this species, and sufficient at sight for its identification.—Cuba, Dominica.

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31. *N. amplum*, BAKER.—*Rootstock* short, upright, densely clothed with matted and wool-like and silky long tawny scales; *Stipites* cæspitose, erecto spreading 2-3 ft. l., clothed at the base abundantly like the rootstock and upwards with a rusty grayish fine closely appressed vestiture of small scales, faintly channelled. *Fronde*s about 3 ft. l., 2-2½ ft. w., tri-quadri-pinnatifid, dull brownish-green papyraceous, upper surface very slightly ciliate, under, naked; *Rachis* costæ and costulæ furfuraceous scaly like the stipes. *Pinnæ* spreading numerous; all but the lowest pair which are much expanded on the inferior side, oblong-acuminate the central ones 4-6 in. w. and 12-15 in. l. all petiolate. *Pinnulæ*, numerous contiguous, the lower ones shortly stipitate oblong-acuminate fully pinnate at the base, upward pinnatifid almost to the costulæ, ultimate segments mostly adnate decurrent at the base, oblong, ½-¾ in. l., 1½-3 li. br., blunt, serrulate lobed or deeply pinnatifid the lobes ¾-1 li. w., 1-2 li. deep. *Veins* pinnate bunches forked once or twice; *Sori* small, situated on the anterior branch near the fork, nearer the mid-rib than margin involucre very minute, early quite obliterated.—Hooker and Baker, Syn., Fil., p. 285. Gr., Fl., B.W.I., *Aspidium* p. 691, *Polypodium Sloaneii*, Kze.

Bermuda, Jamaica, Dominica, St. Vincent, Trinidad; common in dryish woods and half exposed on open banks at low elevations. The fronds present a peculiar colour, produced partly or chiefly by the dull furfuraceous-scaly vestiture of the vascular parts, which on the stipites has a rather fuscous variegated aspect. The rachis and costæ are not at all channelled, the involucre are exceedingly minute and only observable in the earliest stages of the sori; in cutting it resembles *Grisebachii* and *villosum* but is very dissimilar to either in colour and clothing and may be easily recognised by the vestiture of the rachises and by the matted, shaggy soft and silky tawny or yellow-red clothing of the rootstock, a considerable tuft of which is attached to the base of each petiole. Mr. Baker conjectures that this may be Plumiers t. 34 *Aspidium lutescens*, Willd.

32. *N. villosum*, PRESL.—*Rootstock* stout, erect,  $\frac{1}{2}$ –1 ft. diameter densely clothed with linear-acuminate dark coloured scales  $\frac{1}{2}$ –1 in. l.,  $1\frac{1}{2}$  l. w. *Stipites* cæspitose, erecto-spreading stout 3–5 ft. l., 1– $1\frac{1}{2}$  in. thick at the base, dark slightly channelled, scaly throughout, but densely so at the base. *Fronde*s deltoid 4–6 ft. l. and the same w. tri-quadrifid chartaceous, dark-brown green, the upper silky looking. *Pinnæ* spreading, lowest pair, far the largest, and amply developed on the underside, those above these oblong-acuminate  $1\frac{1}{2}$ –2 ft. l., 6–8 in. w. shortly petiolate, the upper ones sessile; *Pinnulæ* very numerous contiguous, oblong-acuminate, sessile 3–4 in. l.,  $\frac{3}{4}$ –1 in. b. pinnatifid nearly to the costulæ, or the inferior ones fully pinnate at the base; tertiary segments oblong, blunt,  $\frac{1}{2}$ – $\frac{3}{4}$  in. l.,  $1\frac{1}{2}$ –2 li. w., serrate lobed or pinnatifid. Teeth  $\frac{3}{4}$  li. b. less or more deep, blunt or rounded; *Rachis* and costæ scaly and rusty furfuraceous; *Costulæ* pubescent, other more or less ciliate especially on the ribs and margins. *Veins* pinnate, branches forked; *Sori* copious, dorsal on the anterior branch, at the base of the teeth medial; *Involucres* ample, dark-brown permanent.—Hooker and Baker, Syn. Fil. p. 286. Hooker, Sp. Fil. Vol. 4, t. 264. *Aspidium Swartz*,—Gr. Fl. B.W.I. p. 690.

*A.* var. *Karstenianum*.—*Fronde*s as large or larger. *Surfaces*, and especially the rachises and ribs, most densely rusty-pilose, texture thinner, *involucres* abortive. *Polypodium Karstenianum*, Kl.

*B.* var. *subincisum*.—*Fronde*s variable in size, ultimate segments usually more or less broader, very variable in their vestiture, but stipites, rachises, &c., always plentifully scaly; uniformly destitute of *involucres*.—*Polypodium subincisum*, Willd, *P. spectabile*, Kl.

*C.* var. *reductum*.—*Fronde*s much smaller, oblong-acuminate, *pinnæ* 1 ft. l., 3– $4\frac{1}{2}$  in. w. the lower ones not enlarged and the lowest nearly or quite equilateral.

Frequent in Jamaica in damp woods and forests specially near water courses, above 2,000 feet altitude. This is a magnificent species possessing the spread and ample dimensions of frond which as a rule characterise the true tree ferns. In the lowest pair of *pinnæ* the *pinnules* on the upper side are not larger than those of the other *pinnæ*, but on the inferior side they are so greatly enlarged that the lowest are from 1– $1\frac{1}{2}$  ft. l. and 4–6 in. w. In old plants the *caudex* is woody, from 1–2 ft. l. and several inches thick. In this state it is prostrate but in the early growth erect. *A* is found in forests at 5,000–7,000 feet altitude in Jamaica. It is well distinguished by the conspicuously rusty-villose rachises and ribs, and the copiously light coloured pubescence of the parenchyma; resembles more closely in habit the type but *B* is always destitute of *involucres*. Some states however are quite identical with the type in the character of thin clothing while others are almost or quite naked. *C* is a smaller form in which the lowest pair of *pinnæ* are equilateral and not at all enlarged. It is common on the banks at Tweedside near 2nd Breakfast Spring, St. Andrew.

33. *N. patulum*, BAKER.—*Rootstock* erect, short, stoutish, densely paleaceous, with bright light tan-brown scales. *Stipites* caespitose, faintly channelled stramineous,  $\frac{1}{2}$ –1 ft. l., freely clothed at the base with deciduous scales like those of the rootstock which in old plants leave scars. *Fronde*s oblong-lanceolate, acuminate a little narrowed, or not at the base, variable in size less than 1–2 $\frac{1}{4}$  ft. l., 3–12 in. w. *Pinnæ* numerous, spreading nearly horizontally opposite or alternate, distant or sub-distant, nearly sessile, lanceolate, acuminate 1 $\frac{1}{2}$ –6 in. l.  $\frac{3}{4}$ –2 $\frac{1}{2}$  in. w., chartaceous, pale, straw, green, naked but vicidulose beneath. *Pinnulæ* oblong or lanceolate, blunt or tapering and acute or acuminate, contiguous or apart, the outer ones adnate-decurrent the interior free, those on the superior side rather larger than on the inferior  $\frac{1}{2}$ –1 $\frac{1}{4}$  in. l., 2–6 li. w., merely toothed or more or less deeply pinnatifid; segments on the superior side the larger, 2–5 li. l., 1–1 $\frac{1}{2}$  li. w. oblong blunt, entire or crenate; rachis and costæ stramineous. *Veins* pinnate, branches forked or simple. *Sori* medial; involucre copious, converse pale.—Hooker and Baker, Syn. Fil. p. 276.

Jamaica; frequent on open or half-open banks at from 4,000–5,000 ft. altitude. This is intermediate in habit between the decompound and simple pectinate pinnæ groups. In fronds which are mature and fully fertile there is much variation in size, and in the character of the base; some are reduced, thin, others are not while the lesser ones are sometimes a little enlarged. Its shape, general pale straw coloured surface, and pale dough-coloured involucre, well mark it. The habit of growth is spreading or pendant. To be compared with *Nephrodium mexicanum*.—Mexico Southwards according to the Syn. Fil.

34. *N. nemorosum*, JENM.—*Rootstock*, stout, erect, the crown densely clothed with long finely attenuated ferruginous scales. *Stipites* 1–1 $\frac{1}{4}$  ft. l., caespitose, spreading, freely scaly, the base with a tuft of bright ferruginous hair-like scales, ascending from the rootstock. *Fronde*s bi-tri-pinnate, 1 $\frac{1}{2}$  ft. l., nearly or quite as wide tinged from the vestiture aureous-brown throughout, chartaceous, the apex finely dentate-acuminate, the base less expanded than the middle rachis, costæ and ribs freely clothed with fibrillose bullate fine aureous scales. *Pinnæ* erecto-spreading bi-pinnate sessile, 8–10 in l., 3–4 $\frac{1}{2}$  in. w., linear oblong, serrato acuminate; *pinnulæ* contiguous sessile, pinnato-pinnatifid, barely connected by the decurrent membrane, serrato acuminate; segments oblique dentate, bluntish 3–4 li. l. to the oblique open but acute sinus 1–1 $\frac{1}{4}$  li. w. *Veins* pinnate simple. *Sori* copious medial in opposite pairs; involucre fugacious at maturity.—Pl. Fil. t. 43, *Aspidium*, Willd.

Grisebach, in his Fl. Brit. W. Ind. Isl. quotes the above figure for *Nephrodium hirtum*, Hook; (*Aspidium*, Sw. *Polypodium* Sw.) either through not looking at the plate, or by misprint in its number. The figure is quite characteristic of the species which is easily identified by the lower pair of pinnæ being smaller than the rest and not at all enlarged on the under side. But for these features in vestiture cutting, colour, it most resembles *N. Amplum*, Baker, West Indies.

35. *N. pubescens*, Desv.—*Rootstock* slender, about as thick as a quill, repent, slightly scaly. *Stipites* contiguous or scattered, erect, rather slender, channelled naked or lightly pubescent, 9–15 in. l. *Fronde*s, deltoid acuminate about a foot each way, bi-tripinnate chartaceous and surfaces throughout pubescent, light green, rather glossy

above. *Pinnæ* spreading, lowest pair deeper on the inferior side all acuminate and petiolate  $\frac{1}{4}$ - $\frac{1}{2}$  in. central ones lanceolate 4-6 in. l.,  $1\frac{1}{4}$ - $1\frac{3}{4}$  in. w. the basal pinnule on the upper side the largest. Pinnulæ ovate or lanceolate acuminate the smaller cuneate at the base  $\frac{3}{4}$ - $1\frac{1}{2}$  in. l.  $\frac{1}{3}$ - $\frac{3}{4}$  of an in. w. the point entire lobed or pinnatifid within, the segments on the upperside at the base largest, and more or less free, entire or toothed  $\frac{1}{3}$ - $\frac{1}{2}$  in. l.  $1\frac{1}{2}$ -3 li. w. teeth sharply acute or mucronate. *Veins* pinnate in the ultimate divisions, the branches not reaching the edge; with the sori dorsal or terminal upon them, involucre pale, delicate fugacious. Hooker and Baker Syn. Fil. p. 280. Hooker and Grev. Icones--Fil. t. 102. *Phegopteris*, Fée; *Aspidium*, Swartz, Gr. Fl. B.W.I. p. 690.

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A. var. *breviculum* JENM.—*Fronds* small, elongato-deltoid (occasionally lanceolate) 4-6 in. l.  $1\frac{1}{2}$ -3 in. w. bi-pinnate, *Stipites* and rachises slender.

Jamaica; common in damp woods among the lower hills reaching up to 1,500 ft. altitude. Distinguished by its creeping rootstock pale colour, pilose surfaces, relatively large pinnulæ and sharp teeth, which would be pungent if the texture were stiffer. The lowest anterior veinlet often terminates about half way to the margins. A. of which *A. Klotzschii* Hook. Cent. Ferns, t. 23 is a good representation of its outline and cutting, is distinct in size and form from the type which characters hardly vary, and are constant under cultivation. It grows in the fissures of rocks, often fully exposed. Usually only the interior segment on the upper side of the pinnules is free but in some states others are as well. Cuba, Porto Rico, and Guadeloupe.

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36. *N. ocropteroides*, BAKER.—*Rootstock* erect or oblique paleaceous, on the crown. *Stipites* tufted, a foot or more l., stone brown channelled, rather glossy, scabrous, clothed below with light or ferruginoses, linear-acuminate scales. *Fronds* sub-deltoid 9-12 or more in each way, quadri-pinnate, coriaceous, light green, paler beneath naked and glossy except the rachises which are pubescent—especially down the channel—and brown. *Pinnæ* spreading, the upper lanceolate the lower deltoid-lanceolate; lowest pair largest, and most developed on the inferior side; those above these rather deeper, on the superior side, acuminate and sharply serrated at the point as is the apex of the frond, especially in the barren state. Interior pinnule of all on the upper side, the corresponding one of the inferior side being absent. Tertiary segments lobed, pinnatifid or fully pinnate at the base, final ones oblong-lanceolate 2-4 li. l., 1- $1\frac{1}{2}$  li. w. cuneate at the base when free, the point acute and sharply toothed in the barren but usually entire in the fertile fronds. *Veins* pinnate or forked in the final segments. *Sori* more or less medial on the veins. Involucres cordate, pale, coriaceous, ample, somewhat ciliate.

Jamaica; discovered by Hart at *Kinrara* Estate on the St. Andrews Mountains in the region of Mt. Moses, 3,000 feet altitude. Intermediate between *denticulatum* and *pubescens*, having the texture of the former but wider final plants. It seems also near *cubense* a species I have not seen. The fronds are light green coriaceous, the petioles and rachises stone colour when dry, channelled and pubescent. The barren fronds seem larger and the teeth are almost mucronate. The very firm involucre are probably eventually deciduous.—Endemic.



37. *N. denticulatum*, Hook.—*Rootstock* woody, rather stout, erecto-decumbent, densely clothed with long dark glossy linear-acuminate scales. *Stipites* caespitose erect 1-1½ ft. l. castaneous, sub-angular and densely clothed at the base with falcate scales like those of the rootstock which have scars when they drop. *Fronde* deltoid quadripinnate 1-1¼ ft. l. and about the same w., acuminate, coriaceous and stiff, glabrous glossy and dark green above paler beneath. *Rachis* and costæ bright light chestnut brown channelled, often rather flexuose. *Pinnæ* spreading lowest pair sub-deltoid deeper on the under side, those above these equilateral 4-6 in. l. 1½-2 in. w. lanceolate acuminate, all petiolate ultimate segments ovate or oblong 2-3 li. l., and about half as wide, cuncate at the base, the outer part cut into sharply pointed or spinulose teeth. *Veins* pinnate in the final segments or forked. *Sori* copious, terminal on the short anterior veinlet or spare receptacles, scaly, involucre dark firm at length deciduous. Hooker and Baker Syn. Fil. p. 287. *Aspidium*, Swartz.

Jamaica Trinidad, and Guiana; always at high elevations in the former country, common in forests at 5,000-7,000 feet altitude, in the latter at the base of Roraima 5,000 ft. alt. In Trinidad it was gathered by Aldridge. The species is well marked by the very abundant dark narrow scales, its stiff texture glossy naked surfaces, and sharp segments and teeth. It varies a good deal in the size of the final segments.

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2. Sub. sp. *Klotzschii*. *Petioles* slender, 3-5 in. l., scales small *Fronde* 3-5 in. l., 1½-3 in. w. tripinnate only at the base; lower *pinnæ* rather larger on the underside; final segments sharply toothed round the outer edge. *Aspidium Klotzschii*, Hook. Cent. Ferns t. 23. *Polystichum aspidioides* Klotzsch.

Gathered on the base of the cliff at Roraima. This is uniformly small with a distinct aspect and quite typical with the plant figured by Hooker, as quoted, S. Brazil.

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38. *N. effusum*, BAKER.—*Stipites* sub-tufted from a strong shortly creeping scaly rootstock, 2-3 ft. l., scaly at the base glabrous, the channel puberulous. *Fronde* deltoid in outline 2-3 ft. l., and as much w. chartaceous quite naked vivid green and shining on the upperside, tri-quadripinnatifid, lowest pair of *pinnæ* largest and much developed on the inferior side, those above these oblong-lanceolate, acuminate 9-12 in. l., 4-8 in. w. lowest pair 1¼-1¾ ft. l. 1-1¼ ft. w.; *pinnulæ* oblong-acuminate 4-6 in. l., 1½-3 in. w. petiolate as are the *pinnæ*, the lowest one on the superior side usually the largest, the costulæ flat and narrowly green winged; ultimate segments flat oblong or ovate oblong, acute, sharply toothed throughout 2-6 li., l., 1-2½ li. b. teeth about ½ li. b. on the upperside. *Rachis* and costæ glossy naked or slightly puberulous down the face, green. *Veins* pinnate in the final segments, the branches simple not reaching the edge. *Sori* dorsal very small, copious reddish brown. *Polypodium Swartz. Polypodium divergens* Hook. *P. multifidum*, Jacq. Icon. t. 643. *Aspidium* Gr. *Phegopteris divergens*, Fée.

Jamaica; common from the lowlands, on banks, waysides and in dry woods up to 5,000 feet altitude and generally distributed over the island, St. Vincent, Grenada, and Trinidad. Distinguished by its decumbent creeping rootstock having the bases of past stipes persistent naked shining, bright green, thin, but firm texture, green winged costulae sharp and freely toothed. Segments and minute copious reddish sori to which I have quite failed to detect an involucre; at the higher elevations in Jamaica it produces beneath a few inches below the apex in the axil of a pinnae, a large densely dark scaled radicate bud, a feature which I have failed to detect in any of the lowland specimens. This form is also found in Brazil *Nephrodium excultum*, Hook. *Polypodium* Mett. is the least cut form with broader segments found chiefly on the mountains.—Cuba, Porto Rico, Mexico, Guatemala, Venezuela, Brazil and Peru.

*Polypodium subincisum* W. and *P. Karstenianum*; Kl. see under *Nephrodium villosum* L. P.

39. *N. macrostegium*, Hook.—*Stipites*, stout, erect 2 ft. or more l. dark, brown glossy, densely clothed at the base with long linear costaneous scales; *Fronde*s ovate-deltoid in out line triquadripinnate 1½-2 ft. l., 1½ ft. w. *Pinnae* erecto-spreading subdistant, alternate, petiolate lanceolate or oblong lanceolate acuminate, basal pair not much enlarged on the underside, 9-12 in. l., 3-4 or 5 in. w. Coriaceous glossy, quite naked; rachis and costae naked and polished brown. *Pinnae* erecto-spreading subdistant, alternate, petiolate, lanceolate or oblong-lanceolate, acuminate, basal pair not much enlarged on the under side, 9-12 in. l., 3-4 or 5 in. w., lowest and largest pinnulae on the upper side of the costa, the largest tertiary division also on the upper side at the base, the latter ovate oblong blunt or pointed ¼-½ in. l. or over 2-3rds as w. *Veins* forked or pinnate. *Sori* copious, involucre glabrous, reniform orbicular at length deciduous. Syn. Fil. p. 501 2nd Ed. Fl. Brazil p. 486.

Guiana; Appun. No. 959, Roraima. In the Brazilian plant, the lowest pinnae are enlarged on the under side of the base.

This is intermediate between *denticulatum* and *amplissimum*; it resembles the former in substance and glossy surface, but is much larger and different in shape and the final segments are blunt not sharp or mucronate.

40. *N. amplissimum*, H.K.—*Rootstock* erect, densely clothed with linear castaneous scales. *Stipites*, tufted erect, strong 1½ ft. 2 ft. l. scaly below like the rootstock deciduously furfuraceous dark-brown polished. *Fronde*s ovate-elongate 4-5 pinnate, 2 ft. l. or more and nearly as wide, lowest pair of pinnae longest and deepest on the underside, coriaceous surfaces, except ribs, glabrous. *Rachis* and costae bright brown glossy channelled, deciduously furfuraceous, especially down the face, narrowly membrane-margined in the outer parts; somewhat flexuose, petiolate, 1¼ ft. l. 5-8 in. b. pinnulae similar in shape and also stipitate, tertiary divisions oblong blunt or acute, pinnate or the outer ones pinnatifid, sub-cuneate at the base, final segments oblong, 2-3 li. l., 1-1½ b. entire acutely dentate or the largest lobed. *Veins* forked or pinnate. *Sori* copious involucre reniform-orbicular deciduous.—Syn. Fil. p. 502. Fl. Bras. p. 485.

Guiana, Roraima, Robt. Schomb. n. 1151. Appun, n. 1108 im Thurn No. 354. Common, very much like *macrostegium* but larger with rather narrower and sharp-pointed ultimate segments and teeth, and rusty furfuraceous rachises, and costae, and thinner involucre, which shrivel at maturity; they are the largest of the most compound species.—Brazil.

41. *N. incisum*, BAKER.—*Rootstock* erect, fibrous: *Stipites* tufted, erect, 1-3 in. l., the base a little scaly. *Fronde*s erect lobed or sub-pinnatifid a span to 1 ft. l.  $1\frac{1}{4}$ - $1\frac{3}{4}$  in. w., tapering at the base through dwindling decurrent rounded scallop-like lobes, tapering similarly upwards to the acuminate lobate entire apex, subcoriaceous dull green, naked or the rachis puberulous, lobes 3-4 li. w. obtuse, cut  $\frac{1}{4}$ - $\frac{1}{2}$  way down to the rachis, the incision forming a sharp sinus between. *Veins* pinnate, simple or forked, opposite ones below the sinus uniting those above, free. *Sori* medial: involucre cordate, fugacious. Pl. Fil. t. 91. *N. stenopteris*, Hook.—*Aspidium* Kze. *Polypodium* Swartz.

This I have not seen, but it is ascribed to Jamaica by Grisebach on the authority of a specimen gathered by Macfadyen, which I suspect belongs to the next species though he quotes Plumier's figure, the two though very distinct being generally confounded in description. Plumier's figure resembles closely some of the forms of *N. scolopendrioides*, Hooker, on which perhaps it is based.

42. *N. Wrightii*, HOOK.—*Rootstock* thick as a quill, much elongated densely clothed with dark-brown scales; *Stipites* apart but contiguous erect, 4-8 in. l., strong, greyish puberulous. *Fronde*s linear-oblong 8-12 in. l.  $\frac{3}{4}$ - $1\frac{1}{2}$  in. b. generally a little narrowed at the base chartaceous; under surface puberulous on the ribs, upper glabrous dull green, fully pinnate in the lower half or third the pinnæ close or apart, the upper part pinnatifid, the pinnæ close, apex pointed, sub-entire. *Pinnæ* horizontal rounded, 3-4 li. w.  $\frac{1}{2}$ - $1\frac{1}{4}$  in. l. the lower ones free at the base and somewhat auricled on each side, the rest adnate and entire. *Rachis* stiff densely puberulous-pubescent, grey. *Sori* medial or nearer the margin, involucre evident. *Veins* prominent 10-20 to a side, close at a wide angle free, or the lowest meeting at the sinus in the upper pinnatifid portion. Hook. Sp. Fil. t. 239.

Jamaica; infrequent on open mountain banks, nearly allied to *scolopendrioides* but of a more regular or equal width upwards and marked particularly by the lower part being uniformly fully pinnate, and the upper deeply pinnatifid, so that the veins do not form costal areolæ and by the different rootstock. The plate cited above is a good figure of it.—Cuba.

43. *N. scolopendrioides*, HOOK.—*Stipites* densely tufted from a small erect or decumbent scaly fibrous rootstock, 1-6 in. l. puberulous, scaly at the base and often deciduously fibrillose repand. *Fronde*s 6-12 in. l., 1-2 in. w. lanceolate or oblong or linear lanceolate acuminate or obtuse at the apex, the base reduced and usually fully pinnate, above this lobed or deeply pinnatifid, subcoriaceous dark green above, paler beneath, upper surface glabrous. *Rachis* costæ and veins beneath densely grayish stellato-puberulous. Segments variable, close or apart with a narrow or broad rounded sinus between them 2-4 li. br.  $\frac{1}{4}$ - $\frac{3}{4}$  in. l. blunt and rounded or sub-acute the reduced lower ones distant, deltoid or oblong, and rounded auricled on both sides at the base, quite free, subcordate sessile; *margins* entire even or crenate. *Veins* pinnate and simple in the outer part of the segments once or more forked within, the branches more or less anastomosing forming costal areolæ the lowest pair from opposite ribs uniting and sending a limb to the sinus where the next pair meet.

*Sori* copious, uni- or pluri-serial on each side the midribs. Involucres small ciliate. Hook Fil. Exot. t. 18. *Aspidium*, Mett. *Polypodium* L. Hook spec. t. 239.

*A. var. extensum*, *Stipites* 6-10 in. l. slender. *Fronde* 15-20 in. l., 2-2½ in. w., cut as in the type, the margin even. *Sori* 1-2 serial.

*B. var. littorale*.—*Fronde* much broader, 10-15 in l., 2-3 in. w. Segments acute or acuminate, longest 1¼-1½ in. l., ¼-⅓ in. w. even crenate or lobulate. *Veins* pinnate in the crenations or lobules, the lowest opposite ones connected; *Sori* in one to several series.

Jamaica; plentiful on the rocky cliffs of the sea coast along the northern and eastern parts of the island. A highly variable plant presenting three or more states which look distinct but run one into the other. The barren fronds are on short stems, are often only slightly lobed and prostrate while the fertile are more erect much longer on long stems with distant reduced basal pinnae which pass upwards into larger more contiguous confluent ones with a costal wing and narrow or open rounded sinuses, the top of the frond becoming gradually merely lobed; the barren fronds are viviparous near the apex. *Forms* of this are often mistaken for forms of *Asplenioides*. Cuba, St. Domingo, and Guadeloupe.

44. *N. bibrachiatum*, JENM. — *Stipites* tufted 2 or 3 in. l., slender channelled puberulous, gray-brown, a few small dark scales at the base. *Fronde* bi-pinnatifid or bi-pinnate 5-6 in l. or over, 1½-2½ w. chartaceous, cloudy-green, the rachis and ribs clothed with gray puberulae, basal pinnae largest, and petiolate to ¼ in. 1-3 pair much broader than above and deeply pinnatifid or fully pinnate at the base, where they are reduced, the segments oblong-linear, obtuse, those next above about 1 in. l. ¼ in. w. free sessile, somewhat lobed in the inner half, the basal lobes largest the outer sub-entire, and the point acute or blunt, uppermost of all entire, adnate and connected, passing into the lobate-entire apex of the frond. *Veins* forked, simple in the segments of the lower enlarged pinnae, the basal ones connected in the others, and sending a branch to the sinus, the outer ones branched and free. *Sori* small, dorsal, the inferior medial, the rest nearer the mid vein of the lobes. *Involucres* small distinct.

Jamaica; a small plant that reminds one both of *Polypodium hastaeifolium* and *Nephrodium tenebricum*. The merely lobed pinnae quite resemble those of the latter but the lowest two or three pairs are enlarged 1½ in. l. ⅔-¾ b. and cut to the costa uniformly into narrow segments. The sori are plentiful but minute. The venation varies with the character of the cutting.—Endemic.

45. *N. tenebricum*, JENMAN.—*Stipites* 4-8 in. l., erect grayish, puberulous. *Fronde* 1-1½ ft. l., 4-6 in. w., gradually reduced both up and down, the acuminate apex pinnatifid and passing through blunt lobes into the entire point, chartaceous, pellucid, dull grayish or brownish-green puberulous on the ribs otherwise glabrous. *Rachis* grayish puberulous. *Pinnae* numerous spreading with an open space between them, the central horizontal and 2½-3 in. l. by ¼-½ in. w., oblong lanceolate and acuminate but rather obtuse, pointed, sessile, and hastate, with a pair of enlarged horizontal lobes at the base, beyond which they are serrulate or slightly lobed, the outer point entire, the inferior ones which dwindle gradually in the lower third or fourth of the frond to mere auricles at the base, being more distant and deflexed. *Veins* 2-4 to a side, the lowest opposite ones uniting

in a branch to the sinus where the next usually join. *Sori* near the base of the veins, involucre minute, soon obliterated.—Journal Botany vol. 9 p. 326.

Jamaica; gathered by Sherring in St. Ann and Clarendon Parishes. It is well distinguished by the gradual diminishing of the fronds downwards in the lower half the subentire and bluntish, though acuminate pinnæ, hastate at the base, which a pair of spreading auricles on each side resembling *Polypodium hastatifolium* on an enlarged scale.

The lowest ones are only  $\frac{1}{2}$  inch long. The rootstock I have not seen but it is probably upright in growth. The nearest alliance is with the Indian *N. arbuscula* Desv. and the preceding.—Endemic.

46. *N. asplenioides*, JENMAN (non Baker).—*Rootstock* erect, often some inches high stoutish, the crown densely scaly. *Stipites* cæspitose, numerous, erecto-spreading 3-8 in. l., slightly brown scaly at the very base. *Fronde* oblong lanceolate 1-1 $\frac{1}{2}$  ft. l. 3-5 in. w., not reduced at the base, pinnate, the apex pinnatifid, pellucid when fresh, naked or puberulous, rather dull or grayish-green, *Rachis* slender grayish with costæ and ribs slightly ciliate and puberulous. *Pinnæ* numerous spreading nearly horizontally or rather up-curved, usually shortly apart or subdistant, subcordate and slightly stipitate at the base, 2-2 $\frac{3}{4}$  in. l., about  $\frac{1}{2}$  in. b., the apex blunt and entire, below this cut into shallow rounded marginal lobes. The lowest pair rather enlarged which are 1 $\frac{1}{2}$ -li. b. the upper pinnæ generally subentire. *Veins* pinnate in the lobes 3-6 to a side branches simple, lowest opposite pair uniting, and sending a vein to the sinus, where the next pair meet. *Sori* small dorsal nearer the mid-rib, involucre minute ciliate early obliterated. Pl. Fil. t. 102—*A. Aspidium*, Griseb. *Polypodium* Swartz, Fl. B.W.I. p. 693.

*A. var. tenera*.—*Stipites* as long but rather more slender. *Fronde* about half as long, nearly as w. *Pinnæ* as wide sometimes wider and usually more deeply lobed, and broader generally above than at the base. The second pair of veins not opposite one or both entering the margin above the sinus. *Involucre* evident, ciliate.—*Goniopteris tenera* Fée Fil. Ant. t. 15, fig. 3.

*B. var. gracilis*.—*Fronde* narrower the upper part elongated, and only pinnatifid, the lower pinnæ reduced and becoming gradually more distant downwards. *Involucre* evident, ciliate. *Goniopteris gracilis*. Moore et Houltst. Fée Fil. Ant. t. 15, fig. 2.

Jamaica; common and widely spread through the island in one state or another between 2,000 and 6,000 ft. altitude, on open or shady banks. A much larger and stronger plant than its sub-species *reptans* with erect spreading fronds never extending and radicate at the apex. The involucre are more obvious in some of the forms than in others, but in nearly all they disappear with age.

*A.* grows plentifully on the side of banks on the way from Kingston to Bath and elsewhere. With this I include all the forms possessing the same shape of frond as the type except that they are shorter and have fewer pinnæ though they vary one from the other in texture, vestiture and other minor characters.

*B.* In its generally narrower form, and elongated tapering, simply pinnatifid upper half or third of the frond, approaches some of the larger forms of sub-species *reptans*, but it is so far as I have observed never radicate, and this is the only permanent distinction between the type and sub-species and upon it the numerous intermediate forms, too variable to define as varieties fall to one or the other group. But possibly even this distinction is not tenable, and the two groups must be completely united.

1. Sub. sp. *sclerophyllum*.—*Fronde*s larger than in the type,  $1\frac{1}{2}$ -2 ft. l. and 6 in. w., not narrowed at the base, elongate-lanceolate, the upper part tapering or long tapering acuminate. *Pinnæ* mostly opposite, spreading, distant, below subdistant above, 3-4 in. l. 6-7 li. w. sessile and rounded at the base, the margins subentire or slightly lobed the outer part quite entire and tapering to the bluntish point; the lowest pair subcuneate at the base, the reduced upper ones broadly adnate to the rachis and oblong, round-pointed and entire. *Sori* copious, *Involucres* stellato-ciliate. *N. aplenioides*, Baker, *Polypodium sclerophyllum*, Swartz, *Aspidium*, Kze.

There is some uncertainty as to what is the plant intended under the name above quoted. My specimens agree exactly with the Kew type, but plants which seem to me distant are placed with that. In the plant here described there is a general resemblance to a much enlarged state of *scolopendrioides*, only that the rachis is free nearly to the summit and only the pinnæ of the upper third of the frond are adnate to the rachis, after the manner of those of *Polypodium chnoodes*. It is a larger darker much less stiff plant than the type, with long slender petioles, and the fronds elongated rather in the upper part, the venation is variable.

2. Sub. sp. *reptans*.—*Fronde*s much smaller the barren prostrate 6-12 in. l. or more elongating into a slender base radicant outer part, 1-2 in. b. the fertile erect, normal in form and not radicant at the apex. *Pinnæ* entire or shallowly lobed, the lower ones often subcordate, the upper confluent and adnate, or all free. *Polypodium reptans*, Swartz. *Aspidium* Gr.

Jamaica; common on limestone rocks, and banks, throughout much of the island, up to 3,000 or 4,000 ft. alti. very variable. The fertile fronds are usually erect on long stipites pinnate to the apex, or pinnatifid in the upper part with an entire point. This character of the soriferous frond is fairly constant, but they sometimes extend into the rambling oft-rooting and viviparous radicant tail that is normal in the short stiped unsoriferous fronds and that characterises the plant.

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47. *N. serrulatum*, JENM.—*Rootstock* more or less stout, erect, a few inches to often a foot or more high. *Stipites* tufted, numerous erect, a span to  $1\frac{1}{2}$  ft. l. grayish puberulous, scaly only at the base. *Fronde*s  $1-2\frac{1}{2}$  ft. l.  $\frac{1}{2}$ -1 ft. w. usually somewhat narrowed sometimes much at the base, chartaceous pellucid, glabrous, or the costæ slightly puberulous or ciliate beneath varying from light to dark green. *Pinnæ* spreading, sub-distant, contiguous above, numerous in the larger fronds, oblong or linear-lanceolate, acuminate, the base truncate or somewhat rounded and sessile 4-7 in. l.  $\frac{1}{2}$ -1 in. b. subentire or with broad appressed lobes or cut to  $\frac{1}{4}$  or less to the axis into rounded even, or crenate close lobes which are  $2\frac{1}{2}$ -3 li. w. *Rachis* strong, channelled, grayish puberulous. *Veins* 3-6 to a side, the opposite inferior pair uniting at a broad angle and sending a long branch to the sinus, at or below which, usually 1-2 others join. *Sori* nearer to the mid vein on the inferior or all the veins. *Involucres* small and soon obliterated.—*Aspidium serrulatum* Mett.—Sl. Hb. t. 45, 46. *Polypodium* Gr. *Polypodium Lunanianum*—Heward in the Magazine of Natural History, N. S. 1838, p. 453.

*A. var. paucipinnatum*.—*Fronde*s relatively small and pinnæ relatively few, the margins sub-entire with appressed shallow lobes colour light, sori usually sparse.

*B. var. angustum*.—*Fronde* medium sized or large with shallow appressed lobes, puberulous dark-green. *Sori* usually occupying all the veins from costa to margin.

Jamaica; abundant on limestone rocks, wherever they come to the surface all through the island. There is much variation in the size of the fronds, number of pinna from  $\frac{1}{2}$ – $2\frac{1}{2}$  dozen, this degree of cutting, the colour (which passes from pale to dark-green) and the paucity or abundance of the sori; the latter varying from a single row along on each side of the costa to as many rows as there are veins to bear it. There is no doubt of the presence of the involucre but it is small and displaced or concealed in time by the ripening sori. There is no absolute and definite line between the forms described. The largest and most lobate state resembles a good deal *Polypodium flavopunctatum* to which it has often been assigned, but though it is pellucid, it is not dotted as is that species.

48. *N. varians*, Fée.—*Rootstock* repent, *Stipites* repent contiguous, erect a foot or more l., paleaceous at the base; *Fronde* erect, oblong-lanceolate, pinnate, chartaceous, glabrous or setose on the ribs, beneath dark green.  $1-1\frac{1}{2}$  ft. l., 7–10 in. b., truncate at the base, with a terminal pinna and numerous spreading similar lateral ones, which are apart ligulate-acuminate, rounded at the base, the inferior ones cuneate and not reduced, shallowly and roundly lobed or sinuated along the margins 4–5 in. l., 6–8 li. w. *Veins* 3–4 to a side, the lower opposite 2 or 3 pairs uniting with a vein running to the sinus. *Sori* medial or nearer the veins; involucre deciduous.—Fée *Fil. Ant.* t. 24, f. 2. Hooker and Baker, *Syn. Fil.* p. 288.

Trinidad; collected by Germain. Resembling *serrulatum* from which the creeping rootstock distinguishes it. The vertical veins which run toward the sinuses are often disconnected.—Endemic.

49.—*N. strigosum*, JENM.—*Rootstock* small, scaly fibrous; *Stipites* very short or winged to the base puberulous. *Fronde*, freely tufted 3–15 in l.  $4\frac{1}{4}$  in w. tapering downwards to the rootstock of two kinds—barren and fertile, the latter elongato-lanceolate stiffly erect and viviparous at the retuse apex, the latter ligulate acuminate reduced prostrate, spreading rosette at the base of the former both serrato-lobate coriaceous, harsh, dark green under surface on ribs and veins gray-puberulous; lobes deltoid or rounded or obtusely pointed shallowly or deeply cut,  $1-2\frac{1}{2}$  li. w.  $1\frac{1}{2}$ –6 or 8 li. d. very close. *Veins* pinnate, raised and obtrusive beneath simple or rarely forked, the opposite ones below the acutely sharp sinus united, those above free. *Sori* medial; involucre distinct cordate puberulous. Fée, *Fil. Ant.* tab. 15, fig. 1.

Jamaica; in woods of the lower hill sides. Fée's figure is a quite exact representation of the erect fertile fronds but does not show the spreading prostrate diminuated barren ones Plum, *Fil.* t. 91. A much larger plant that has not been identified is much like this but larger with a broad flat sinus, dentate as wide as the segments themselves. Other resemblance characteristic of this would seem to indicate its being simply a large state. The lobes in each are nearly evanescent near the base, passing finally into plain wings at the rootstock.

50. *N. unitum*, R. Br.—*Rootstock* wide-creeping in water as thick as a quill, cylindric, dark-coloured, eventually naked. *Stipites* erect, distant, 1–3 ft. l., naked dark-brown channelled. *Fronde* oblong-lanceolate,  $1\frac{1}{2}$ –3 ft. l., 5–10 in. w., not narrowed at the base, dark green, naked or ciliate, with a few small brown scales beneath,

coriaceous and stiff. *Pinnae* erecto-spreading, numerous, 1-2 in. apart below, 4-6 in. l., 4-5 l. w., rounded at the base, and the lower ones substipitate and a little narrowed these acuminate or bluntish and crenato-entire at the apex, below this cut  $\frac{1}{2}$ - $\frac{1}{3}$  to the costæ into confluent broad deltoid or rounded lobes, rachis stiff dark-brown, puberulous or naked. *Veins* fine and close, pellucid, deeply curved, 6-9 to a side, the lowest pair sending a branch to the sinus where the next pair meet. *Sori* copious, medial, involucre naked at length dark brown.—Hooker and Baker, Syn. Fil. p. 289. *Aspidium* Gr. Fl. B. W. I., p. 693. *A. gongyloides*, Schk. *A. propinquum*, R. Br.

Jamaica; plentiful in salt pond, near Guava Ridge, St. Andrew, between ,000 to 4,000 feet altitude. Guiana, common in unused trenches, wet savannahs and the sides of rivers. This is a purely aquatic species, with slender wide-spreading branched rhizomes which spread in a diffused manner through the other herbage of shallow water. It is well marked by these characters, its coriaceous texture generally, dark colour. *N. gongyloides*, Schk., is a pale thinner form found on the Continent, and narrow *pinnae* with broad shallow deltoid or rounded lobes. The upper *pinnae* are merely serrulate and the apex of the frond is either pinnatifid, or terminates in a distinct lobed pinna. The under surface is often nearly pubescent. Most tropical and sub-tropical countries of the Globe.

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51. *N. calcarum*, JENM.—*Rootstock* stoutish, erect, the crown scaly. *Stipites* caespitose, erect brown darker at the base which is clothed with deciduous dark brown palæ channelled  $\frac{1}{2}$ -1 ft. or more l. *Fronde* erect, lanceolate or ovate lanceolate  $1\frac{1}{2}$ -2 ft. l., 6-8 in. w. pinnatifid or sub-pinnatifid, dark green chartaceous. *Rachis* and *Costæ* puberulous, other surfaces naked; equally reduced both ways. *Pinnae* spreading, contiguous or apart  $3\frac{1}{2}$ - $4\frac{1}{2}$  in. l.  $\frac{1}{2}$  in. w. more or less, sessile and free at the base uniformly lobed on both sides, the point  $\frac{3}{4}$ -1 in. l. entire and bluntish, the lower one more distant and gradually reduced to  $\frac{1}{2}$  in. l. the upper passing through lobes to the bluntish quite entire point. Lobe cut 1-3rd or more of the depth to the costæ  $1\frac{1}{2}$ -2 li. w. hardly as deep, the lowest pair uniformly enlarged, obliquely sub-deltoid the margin even. *Veins* simple curved 4-6 to a side the lowest opposite ones united, sending a single branch to the sharp sinus near which the next pair enter. *Sori* nearer the mid vein: involucre small, fugacious. Brittons Jour. Bot. vol. 24, p. 271.

Jamaica; Ocho Rios Gully, St. Ann, discovered by Sherring growing in moist forests, on wet calcareous rocks. It is a smaller plant than *usitatum* its nearest ally, with the under surface similarly microscopically warted, but with as a rule narrower *pinnae*, less acuminate at the entire points, and with enlarged basal lobes, the inferior ones being gradually reduced till the lowest are only  $\frac{1}{2}$ -1 in. l. The latter is an unmistakable determining character. The upper *pinnae* are subtire throughout, more or less free, and auricled on both sides at the base.—Endemic.

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52. *N. usitatum*, JENM.—*Rootstock* stout, erect, often a span or more, high densely paleaceous with dark dull brown scales. *Stipites* caespitose, numerous erect, 9-15 in. l. channelled, dark and clothed below like the caudex, deciduous, fibrillous upwards. *Fronde* erecto-spreading,  $1\frac{1}{2}$ - $2\frac{1}{2}$  ft. l. 9-12 in. w. the apex pinnatifid and passing through mere lobes to the acuminate serrato-attenuated point, thinly chartaceous pellucid, dark-green and glossy above and naked, pale



beneath and slightly ciliate on the ribs and somewhat grayish from copious scattered minute tubercula. *Pinnae* numerous, distinct spreading nearly or quite horizontally 4-7 in. l.  $\frac{3}{8}$ -1 in. w. the lower 1-2 pair little or hardly reduced and sometimes narrowed at the base, upper ones truncate and sessile, widest rather at the base or more often uniform in width the greater part of this length passing into the finely acuminate serrate entire point; cut a third or more to the costæ into shallow broadly rounded lobes 2-3 li. w. margins, scariose crenulate-entire. *Veins* pellucid simple. 4-8 to a side, the lowest pair uniting and sending a branch to the sinus, where the next pair meet. *Sori* medial or nearer the midrib, involucre minute and early obliterated.—*Journal Botany*, Vol. 8, p. 261. *Si. Cat.* p. 20, *His.* p. 90, t. 48, Fig. 2, *Herb.*

Jamaica; common in the damp woods among the lower hills, gathered in St. Andrew and St. Mary parishes. I have a specimen from Clarendon, the pinnae of barren fronds are twice as wide as those of fertile, and closer together. The sori are often confined to the outer part of the pinnae and to the lobes, as in the preceding species to which it has nearest affinity, but from which the different scales of the caudex and stipes, narrow pinnae, shallower lobes obscure involucre and other characters abundantly mark it. The involucre are only observable in a young state of the sori. In the narrower pinnæd fronds the lobes are twice as wide as deep in the wider they are about equal each way. The texture is often membranous. Generally found near streams.—Endemic.

53. *N. venustum*, J. Smith.—*Rootstock* stout, erect, often several inches high, the crown densely clothed with large chestnut-ovate acuminate scales; *Stipites* erect;  $1\frac{1}{4}$ -2 ft. l., clothed at the base like the rootstock, not or slightly channelled, brown. *Fronds* 2-3 ft. l.,  $1-1\frac{1}{2}$  ft. w., the apex pinnatifid. *Pinnae* numerous, spreading, or erecto-spreading 5-9 in. l.,  $1-1\frac{1}{2}$  in. w., the lowest as large, or 1-3 pairs reduced and stipitate or not, distant or sub-distant, broadest at the base and thence narrowed outwards or uniform along the inner half or two-thirds, the acuminate point sub-entire; cut down half way or rather more to the costæ into close flat broad lobes 3-6 li. deep and  $2\frac{1}{2}$ -3 li. b. 1-2 basal lobes reduced or not in the lower pinnae, chartaceous, pellucid, ciliate on the ribs and edges, dark green above and glossy, paler beneath; margins entire or subcrenulate brown, puberulous as are the paler costæ. *Veins* simple, 8-12 to a side, lowest pair uniting below with an excurrent branch, or at the sinus to which the next pair are contiguous. *Sori* medial or nearer the edge, the latter in the broader pinnae; involucre as large dark or cinnamon brown, naked. *N. Fendleri*, Hook. *Aspidium*, Heward, in *Magazine of Natural History* 1838, page 453.

Jamaica; common in the forests of the central parishes at 2,000 ft. altitude, gathered near Mount Olivet, Manchester, and on Mount Diabolo, St. Ann. Variable in the breadth of the pinnae and position of the sori. The fronds present two states—a broad and a narrow pinnae, in the former the pinnae are 1 in. w., and in the latter  $1\frac{1}{2}$ . Scattered on the underside sparsely or more plentifully, are minute microscopic pale blistered points. In the large state the fructification is confined to the lobes, while in the smaller in which it is generally medial it descends to the lower veins at or below the sinus. With regard to Jamaica specimens of this species Mr. Baker writes me. *N. Goodeenovii*, Baker *inidit*, founded on *Polypodium sinuosum* of Bishop Goodenough's herbarium—Jenman, n. 41, received July, 1878, differs from Venezuelan *N. Fendleri* Hook. by more decidedly pubescent frond, narrower pinnules and less distinct veining, but scarcely worth separating from it as a species.

54. *N. subcuneatum*, BAKER.—*Rootstock*, woody. Shortly elongated, erect or decumbent beset with the bases of the past stipites. *Stipites* tufted 1–1½ ft. l. rather slender, erect stone brown puberulous, or naked channelled. *Rachis* similar. *Fronde*s 1–1¼ ft. l. 6–10 in. w. pinnate or sub-bipinnatifid, chartaceous, light or dark green, glabrous or the ribs only puberulous, ovate acuminate, or ovate-lanceolate the base not reduced. *Pinnæ* spreading 3–5 in. l. ¾–1½ in. w. 6–12 to a side below the pinnatifid acuminate apex of the frond, lower ones from 1–2 in. apart lowest pair often deflexed and with the next above narrowed and subcuneate at the base, those above closer truncate, the upper ones partly adnate and subentire the rest cut about 1–3rd—the depth to the costæ into close obliquely rounded lobes that are 2–3 li. w. entire with a narrow sinus between, the outer ones rather abruptly passing into the entire acuminate end of the pinnæ. *Veins* simple 6–9 to a side, the lower much curved, and the lowest opposite pair united or casually disconnected sending a vein to the sinus, the next pair entering there, or joining the vertical vein just below it. *Sori* medial small, involucre small ciliate,—Hook and Baker, *Syn. Fil.* p. 303, 2nd Ed.

Guiana; frequent in forests gathered on the Cabilibo and Demerara Rivers (Jenman n. 405 and 2227) and in Cayenne by Le Prieur. It has a resemblance to *Polypodium tetragonum* Sw. but is not nearly so stiff, and pinnæ are as a rule broader and nearer, and they pass upwards, gradually instead of suddenly, into the pinnatifid apex of the frond. It is undoubtedly involucre only the one or two sometimes the third partly lower pinnæ are reduced and somewhat cuneate at the base, but the lobes still show these like reduced steps. The scales that crown the rootstock are few and small, and dark brown. This is *N. subovatum*, Jemm. in “Argosy” Demerara.—Endemic.

55. *N. deflexum*, J. SMITH—*Stipites* slender, erect, 1¼–2 ft. l. rather glossy, dark-brown naked, excepting a few small deciduous brown scales at the base. *Fronde*s about a ft. l. 6–9 in. w. ovate acuminate, chartaceous very dark-green, glabrous except the slender dark channelled rachis which is puberulous. *Pinnæ* spreading the lowest pair deflexed, the central horizontal, the upper rather falcate, passing gradually or abruptly into elongated pinnatifid lobate-entire acuminate apex of the fronds; larger ones 3–4½ in. l. ¾ in. b. sessile and truncate at the square base uniformly lobed or sub-pinnatifid to ½ or ⅓ the depth to the costa, the outer part entire and acuminato-caudate. Lobes close rounded with an even edge ½–2 li. w. and about the same deep to the close sinus. *Veins* simple 4–6 to a side the inferior 2–3 pair much curved and running together into the pellucid streak at the sinus. *Sori* 3–5 to a side rather nearer to the midrib than margins. Involucre brown ciliate.

Trinidad; in forests gathered by Alridge, near the last preceding which it closely resembles and *N. refractum* Hook. *Sp. Fil.* Vol. 4, t. 252. In habit it most resembles *Polypodium tetragonum* Sw. but the frond is broader in proportion to the upper making the frond rather elongato-deltoid in shape and the lowest pair of pinnæ are uniformly refracted at an acute angle with the rachis. All have a decided curve upwards most especially the upper ones. The terminal pinnæ is broad at the base and pinnatifid, thence passing through shallow lobes to the entire acuminate outer part and it is sometimes proliferous near the base. I have not seen it from any country but Trinidad.

56. *N. deltoideum*, Desv.—*Stipites* cæspitose from a decumbent elongated rootstock, channelled 3–6 in. l. below the merely auricled portion of the fronds, scaly and slightly muricate at the base. *Fronde*s 1½–2 ft. l. 6–9 in. w. the apex pinnatifid with blunt lobes suddenly reduced in the lower half or third to small auricles which line the stem on each side decreasing in size to the base hard and subcoriaceous in texture dark green paler beneath. *Pinnæ* spreading, contiguous or subdistant 3–5 in. l.  $\frac{3}{4}$ –1 in. w. truncate and sessile at the base, the acuminate or bluntish apex subentire; cut 2–3rds to the costæ into close flat oblong, obliquely rounded, straight or sub-falcate segments 2–2½ li. w. and 3–4 li. deep to the sharp sinus. Margins entire, rather convex when dry; Rachis channelled and with the costæ more or less pubescent on the face, puberulous beneath and on the ribs; surfaces otherwise naked. *Veins* conspicuous close simple, 10–12 to a side, lowest pair running together to the sinus, a medial pellucid streak from the costæ passing between them. *Sori* nearly medial dark purplish brown, deciduous; involucre small fugacious. *Polypodium* Swartz.

Jamaica; common in moist forests from 2000–4000 feet altitude. The lower 1–2 pair of the normal pinnæ are usually a little shortened and deflexed. The segments are close together at the ends, not divergent there, as is more or less generally the rule in other cases. It is a very peculiar plant in several of its features. The auricles which constitute the lower half of the frond and dwindle from  $\frac{1}{2}$  or  $\frac{3}{4}$  in. l. at the top to less than a  $\frac{1}{4}$  in. at the base, exceed the normal pinnæ in number usually considerably. The pellucid medial streak which runs from the costa between the lowest pair of veins to the sinus is also an exceptional character. The veins are raised on both sides—Cuba.

57. *N. Grayii*, Jenm.—*Fronde*s erect, chartaceous, pellucid, quite glabrous bright green. Rachis and costæ glabrous brown or stramineous rather bright. *Pinnæ* spreading, truncate and sessile at the base, the apex acuminate and entire, 8–9 in. l.,  $1\frac{1}{4}$ – $1\frac{1}{2}$  in. w. cut half way or rather more toward the costæ into flat curved rounded segments lying close together with a sharp sinus between. *Veins* simple, spreading, the upper ones at a broad angle, close 14–16 to a side several of the lower opposite pairs joining a pellucid streak that runs to the sinus. *Sori* forming a double row distant from the margin and near to the mid-rib; involucre reniform, at length dark brown and shrivelling up or deciduous.

St. Lucia, Gray, N. 17.—A species intermediate between *N. brachyodon* and *Polypodium megalodus*, but with more numerous veins than either, a cleaner brighter surface and sori, finally dark brown in nearly confluent lines, close to, but slightly clear of the mid-rib, and quite distinct, but eventually shrivelled, very dark brown involucre. The close dark brown lines of sori remind one of *Polypodium decussatum*. It resembles a good deal and may perhaps be *Goniopteris rostrata*, Fée. Fil. Ant. t. 17. f. 3, but the sori in that are shown as medial in the figure.—Endemic.

58. *N. brachyodon*, Hook.—*Stipites* erect,  $1\frac{1}{2}$ –2 ft. l., grayish-puberulous as is the rachis, deciduously scaly at the base; *Fronde*s ample. 2–3 ft. l., and nearly as wide, chartaceous, pellucid dark grayish green, puberulous, especially beneath, and most densely on the costæ and ribs the upper side at length glabrous, not reduced at the base, with a large terminal pinna and 8–10 pair of similar lateral ones, which are spreading 9–12 in. l.,  $1\frac{1}{2}$ –2 in. w. truncate or rather rounded at the base and petiolate in the lower half of the frond, the

lowest pair shortly narrowed there, oblong-lanceolate and nearly uniform in width to the acuminate outer part, the point sub-entire, approximate or sub-distant, the upper ones shortly adnate to the rachis; cut  $\frac{1}{2}$  or  $\frac{1}{3}$  to the costæ into broad flat, sub-falcate obliquely-rounded close segments that are  $3\frac{1}{2}$ – $4\frac{1}{2}$  li. w., and  $\frac{1}{3}$  to  $\frac{1}{2}$  in depth to the sharp sinus. Margins entire, subcrenulate, and slightly setose. *Veins* simple, raised beneath 12–18 to a side lowest pair uniting, and sending a branch to the sinus below which 1–3 other pairs join. *Sori* medial, involucre small, puberulous, fugacious or some concealed by the sporangia.—Hooker and Baker, Syn. Fil. p. 295. *Aspidium* Gr. Fl., B.W.I., p. 693. *Polypodium*, Kunze. *Phegopteris Seemanii*. J. Smith.

Jamaica, St. Lucia, Montserrat, St. Vincent, Trinidad and Guiana; infrequent on the islands among the lower hills; in Guiana gathered by myself on the Cabalibo, and elsewhere by Appun. A very fine plant of few large pinnæ and great width of frond, of a dull grayish green colour from the vestiture of stellate puberula, thinly chartaceous substance copious veins, and minute generally obscure involucre. It closely resembles *Polypodium megalodus* for which it is often mistaken, and with which it has nearest affinity, but is distinguished by its much larger size. Copious puberula and presence of involucre. My specimens are without rootstock, but it is probably similar to that of *Polypodium tetragonum* and its allies.—Panama to Brazil, Peru and Jalapagos.

59. *N. jamaicense*, BAKER.—*Stipites* caespitose from a strong, wiry-rooted erect rootstock, slightly scaly at the base, 3–6 in. l. grayish puberulous. *Fronde* oblong-lanceolate 1– $1\frac{3}{4}$  ft. l. 4–6 in. w. shortly reduced at the base, hard and subcoriaceous, grayish green, puberulous on the costæ and slightly, also often on the general surface; rachis grayish with dense stellate puberula and channelled. *Pinnæ* contiguous or sub-distant spreading, stipitate or nearly sessile, 2–4 in. l.  $\frac{1}{2}$ – $\frac{7}{8}$  in. w. oblong lanceolate, the point subentire, bluntish or acute, lower 1–3 pairs more or less reduced and depressed cut  $\frac{1}{2}$ – $\frac{3}{4}$  to the costæ into oblong blunt crenate or undulate subreflexed segments, which are widest within and open at the apices with a subreflexed margin (appearing on the upper side as if thickened,) basal pair reduced in the lower pinnæ. *Veins* 8–10 to a side, simple, or the lower ones openly forked near the margins, raised beneath, but evanescent at the sori, branches of the costal pair often forming with the vein that runs from the inferior limb to the sinus a pair of areolæ between the forks. *Sori* small nearer the margin below, but the midrib above indusium small, clothed with stellate puberula—Journal Botany Vol. V, p. 264.

Jamaica; infrequent on half open banks and in forests from 3,000–5,500 ft. altitude. St. Andrew and Portland Parishes, Old England, and the region of the Government Cinchona plantation. Midway in general aspect between *deltoidum* and *Polypodium asplenoides*. The general gray colour, pale and permanent costæ ribs and veins of the underside, crimped edge, that runs as if thickened on the upper side, the branched veins and the areolæ which are often found within this fork of the costal pair, well distinguish the species, the segments are somewhat unequal occasionally.—*N. bermudianum*, Baker, is nearly identical with this.—Endemic.

60. *N. bermudianum*, BAKER.—*Rhizome* slightly creeping. *Stipe* greenish, naked,  $\frac{1}{2}$  ft. long. *Fronde* oblong-lanceolate, bi-pinnatifid a foot long moderately firm in texture, hairy on both surfaces and the stramineous rachis. *Pinnæ* close, multijugate, lanceolate the largest

2-2½ in. long,  $\frac{5}{8}$ - $\frac{3}{4}$  in. broad, the lowest rather reduced and obscurely stalked. Pinnules reaching down to a broad wing, oblong entire, contiguous  $\frac{1}{2}$ - $\frac{1}{8}$  in. broad. Veinlets 6-8 jugate erecto patent, distinctly raised, simple, rarely forked, only the lowest pair distinctly uniting. *Sori* small, medial, indusium small, reniform fugacious—Voyage Challenger Bot. Vol. I, p. 86. t 13.

Hab. Bermuda; received at Kew dried from General Lefroy and Professor Farlow, and alive from Major-General Sir Robert Laffan. Allied to *jamaicense* and *asplenioides* but nearer the former which it closely resembles. I am indebted to Mr. Baker for the description.—Endemic.

61. *N. triste*, Hook.—*Stipites* 1½-2½ ft. l., naked or puberulous brownish strong. *Fronde*s 1½ ft. l., 8-10 in. w., erect, firm and rather stiff, naked or nearly so, very dark green, rachis stiff channelled. *Pinnæ* erecto-spreading, lowest pair as large, 6-8 in. l., 1-1½ b., with a similar terminal one, upper ones sessile lower petiolate the pinnules suddenly narrowed at the base and decurrent on the pedicels, above this deeply pinnatifid to  $\frac{3}{4}$  or  $\frac{5}{6}$  the outer part passing into a sub-entire point. Segments close, oblong, curved, obliquely rounded or sub-acute, 2 li. w., 4-6 li. deep to the usually sharp sinus. *Veins* curved close simple, the lowest two pairs meeting below or at the sinus. *Sori* copious, medial reaching from the costa to the top of the segment; Syn. Fil. p. 266. Fl. Bras. p. 476.

Guiana; locality not known; very near *N. tetragonum*, but rather more deeply cut and having the reduced, decurrent sides of the base of the lower pinnæ longer, and plain instead of lobed or step-like as it is in that species.—Columbia and Peru.

62. *N. tetragonum*, Hook.—*Rootstock* woody, shortly elongated, decumbent, paleaceous at the growing end. *Stipites* approximate erect 1-1½ ft. l. subtetragonal dark brown finely stellate pubescent or puberulous, and with a few deciduous scales at the base. *Fronde*s firm very dark green; puberulous and ciliate especially on the ribs and edges, which are often densely setiferous; the rachis channelled and finely pubescent 1-1¾ ft. l.  $\frac{1}{2}$ -1 ft. w. with 8-16 pair of erecto patent, more or less contiguous pinnæ, the lowest of which are not reduced, and a distinct terminal deeply pinnatifid one of about the same size. *Pinnæ* about a span l. 1-1¼ in. w. the point subentire, below this pinnatifid half or two-thirds to the depth to the costæ the lower ones stipitate and abruptly narrowed at the base, lobes entire subfalcate, blunt close 2 li. w.  $\frac{1}{2}$  in. deep. *Veins* close, rather curved, about 12 to a side the lower two or three opposite ones meeting at the sinus. *Sori* copious, medial, reaching from the base to the top lobe; involucre small setose, at length obliterated.—Hooker and Baker—Syn. Fil. p. 226.

Guiana; gathered in forests on the Berbice River, (Jenman N. 1558 and 1792.) As *aureo-vestitum* closely resembles *Polypodium tetragonum* Sw., so this closely resembles *P. megalodus*, Schk. The colour is however rather darker and the texture though not thick, harder. The *Sori* is copious and in a young state the involucre quite cover the *Sori* and are copiously setiferous. The lower veins curve upwards and run together into the sinus, sometimes joining below it, and the interior basal one of each series generally springs from the costæ instead of the rib. In *Species Filicum*, it is ascribed to Guadeloupe (identity dubious) St. Vincent, New Granada and Venezuela to Brazil.

63. *N. aureo-viridum*, Jennm.—*Stipites* erect, 1–2 ft. l., with a few deciduous fibrillose scales at the base, very finely ciliate. *Fronde* 1–2 ft. l.,  $\frac{3}{4}$ –1 ft. w., membranous pale beneath, with an aureous tinge from the sporangia, ribs slightly ciliate, and rachis also finely so, composed of a long acuminate terminal pinna, which is deeply pinnatifid at the base, and 10–12 pair of very distant spreading sub-opposite lateral ones about 6 in. l. and  $\frac{5}{8}$  of an in. w. the lowest not reduced, sessile or almost so, the one or two pair inferior, narrowed slightly at the base, cut down about half way to the costa into straight broadish round entire lobes that are about 2 li. wide and 4 d., the acuminate apex entire. *Veins* six or seven to a side, lowest pair sending a vein to the sinus where the next pair meet. *Sori* close along the mid vein reaching from the base to the top of the lobe, those on the lowest veinlets elongated and confluent. *Involucres*, small, densely setiferous, fugacious receptacles ciliate.

Guiana; gathered on the Berbice River (Jenman n. 1793.)—Closely resembling *Polypodium tetragonum*, Sw., of which it is probably only an involucrate variety, but larger, with distant (2–3 in. apart) ligulate pinnae membranous texture, aureous green tinge of the pale underside, and the basal sori of the opposite pair of veins confluent. The involucres are conspicuous in a young state quite covering the sori, and very densely setiferous. It seems to be near *N. nitidulum* Baker of Bahia.—Endemic.

64. *N. serra*, DESV.—*Rootstock* free creeping subteraneous. *Stipites* apart, strong erect, stramineous 2–3½ ft. l. *Fronde* 2–4 ft. l. 1–1¾ ft. w. hard and rather rigid when dry, light green, naked above, beneath grayish and rather puberulous. *Pinnæ* very numerous spreading, linear and finely serrato, acuminate 8–12 in. l.  $\frac{1}{4}$ –½ in. w. sessile, the lower ones in part narrowed at the base 1–1½ in. apart, the terminal conform but wider; cut  $\frac{1}{2}$ –2–3rds to the costæ into close sharply-acute, subdeltoid or subfalcate segments. Rachis subangular channelled and with costæ and ribs stramineous and coated with stellate puberulae. *Veins* very close, simple, 8–12 to a side 3–4 lowest pairs terminating at the sinus. *Sori* medial involucres as large, pale, puberulous, Sl. t. 48, fig. 1.

*A. var. augescens.*—*Pinnæ* 2–4 li. w. narrowed at the base, less deeply incised; teeth subdeltoid, or acute, broader and more shallow than in the type. *Aspidium augescens*, Schk.

Jamaica; common and gregarious on roadside banks or in wet ground near rivers, or streams up to 2000–3000 ft. altitude. The variety is well marked and has very narrow pinnae which are narrowed to the base, and erect. This is Wrights n. 923, gathered in Cuba and by Purdie in Jamaica at Lapland St. James, but common and I have gathered it in several places elsewhere in Jamaica. It is well figured in Sloanes tab. 48 fig. 1 vol. I.

65. *N. Sloanei*, BAKER.—*Rootstock* horizontal, subteraneous, free-creeping strong, scurfy. *Stipites* apart or distant erect strong sub-angular dark and a little scurfy-scaly at the base, above stramineous 2–4 ft. l. *Fronde* ample 3–4½ ft. l. 1–2 ft. w. firm and rather stiffish, naked or the ribs slightly puberulous, beneath rather light green. *Pinnæ* numerous, spreading, 1½–2½ in. apart very finely serrato-acuminate the upper ones broadest at the base and sessile lower ones narrowed there and stipitate, the lower pair reduced and often deflexed, 9–15 in. l.  $\frac{3}{4}$ –1¼ in. w. pinnatifid at the narrowly

winged costæ. Segments narrow sub-falcate, point sub-acute  $\frac{1}{2}$ - $\frac{3}{4}$  in. l.  $\frac{1}{8}$  in. b. close or with as much as their own width between them. Margins cartilaginous edged, even. Rachis strong and with the costæ stramineous and nearly or quite glabrous. *Veins* 15-20 to a side simple close, pellucid, lowest pair curved and running together to the sinus. *Sori* medial involucre as large pale or flesh coloured naked, or puberulous. *Aspidium invisum* Swartz, Sl. t. 50, fig. 1, Herb. pl. Fil. t. 22.

Jamaica; common among the lower hills and widely spread through the country ascending 5,500 ft. altitude on banks and other open places; Dominica and Trinidad. A very fine species, the fronds however not erect but arching from the base outwards. Much wider pinnae than *N. serra*, to which it is closely allied. The texture is rather thin but hard becoming rigid when dry. The rootstock is very wide creeping under the surface of the ground with the stipes scattered along it. Frequently the fructification does not reach the outer part of the pinnae. *N. paucijugum* Jenm. of Jamaica may be a young state of this. The specimen on which it is founded, has a creeping rootstock, naked stramineous glossy petioles and rachises, pale green naked, bi-pinnatifid fronds, truncate at the base simple oblique veins, several to a side, which run into the serratures of the segments.—Cuba, Mexico to Brazil.

66. *N. connexum*, KULM.—*Stipites*, erect and with the rachis pale and pubescent. *Fronds*, elongate-lanceolate bipinnatifid 2-4 ft. l.  $1\frac{1}{4}$ - $1\frac{1}{2}$  ft. w. stiff subcoriaceous ciliate chiefly on the ribs beneath, and margins. *Pinnae* spreading, ligulate acuminate with a mamiliform gland at the base beneath, 8-10 in. l.  $1-1\frac{1}{4}$  in. w. cut half or more to the rachis into acute entire falcate lobes, which are  $1\frac{1}{2}$ -2 li. w.  $\frac{1}{3}$  in. deep, to the acute cartilaginous pellucid sinus. *Veins*, simple curved, 16 or 18 to a side. 5 or 6 of the lower opposite ones meeting at or below the sinus with a branch running from the lowest pair thereto. *Sori* in a line on each side and close to the midrib reaching from the base upwards, involucre distinct, sub-ciliate. Syn. Fil. p. 502 (2nd Ed.) Fl. Bras. p. 489—*Aspidium* Mett.

Guiana; collected by Martin in Cayenne, near *Sloanei*, but not so deeply cut and surface pubescent.—Endemic.

67. *N. guadalupense*, Fée.—*Stipites* numerous, caespitose from a short upright rootstock, 15-21 in. l., not, or faintly channelled, grayish-puberulous, and sparsely deciduously scaly at the base; *Fronds* spreading, ovate-lanceolate, the acuminate apex pinnatifid, 2-3 ft. l., 10-15 in. w., thinly chartaceous, pellucid grayish green especially beneath and dotted with minute scattered stellate puberulae as is the rachis and ribs also. *Pinnae* numerous spreading  $1-1\frac{1}{2}$  in. apart, 6-8 in. l.,  $\frac{3}{4}$ -1 in. br., upper ones truncate and broadest at the base, lower shortly narrowed there, and more distinctly stipitate, lowest pair not or little reduced and deflexed or horizontal; cut  $\frac{1}{2}$ - $\frac{2}{3}$  to the costæ into flat obliquely rounded subfalcate entire segments 2 li. b. and 3 li. d. to the narrow sinus, which pass gradually outwards into the finely-acuminate sub-entire point. *Veins* simple, 10-12 to a side, 1-3 lowest pair uniting at, or the inferior pair running together to the sinus; *Sori* medial, involucre small pale puberulous. Hooker and Baker, Syn. Fil. p. 503 (2nd Ed.) Fée, Fil. Ant.

Jamaica; common in forests and shady waysides from 1,500-4000 ft. altitude. The terminal pinna is hardly distinct though in cutting more or less resembles the lateral but is generally broader, the upper pinnae being greatly

reduced till they pass into it, marked by its gray stellate puberulous vestiture which is very dense on the rachis costæ and ribs broad lobed pinnæ, the lower ones of which are narrowed cuneate form at the base. The fronds are broadest in the lowest third or half from whence they narrow gradually to the apex. The rachis is relatively slender.—Trinidad, Guadeloupe and Grenada.

68. *N. patens*, DESV.—*Stipites* bi-serial along a subterraneous strong horizontal creeping rootstock, erect, 1–2 ft. l. not channelled, with a few deciduous scales at the base. *Fronde* erect,  $1\frac{1}{2}$ –3 ft. l. 8–12 in. w. papyraceous rather flaccid more or less pubescent throughout, paler beneath than above, tinged gray by the light coloured pubescence. *Pinnæ* numerous, spreading distant, or subdistant, below sessile, lowest 1–2 pair little reduced usually and deflexed, acuminate with a serrato entire point 4–6 in. l.  $\frac{3}{4}$ – $\frac{3}{4}$  in. w. widest at the base and tapering outwards or the lower ones of a uniform width along the inner half or two-thirds cut  $\frac{2}{3}$  or  $\frac{3}{4}$  to the costæ into entire close oblong bluntish segments 2–3 l.–l. from the acute sinus and 1–2 l. b. a little dilated or not at the confluent bases. *Rachis* strong, not or only faintly channelled, subangular more or less pubescent and grayish. *Veins* simple 7–9 to a side, lowest pair meeting at or below the sinus. *Sori* medial; involucre as large, pale, freely ciliate. *Aspidium*, Swartz Eat. Fern N. Am. pl. 70, Sl. t. 62 fig. 1.

Bermuda and Bahamas to Trinidad and Dominica; common in open and bushy places and by waysides and ascending in Jamaica to 5000 ft. altitude. This is distinguished absolutely from all its allies possessing the same aspect of frond, by its creeping horizontal underground rootstock upon which the fronds are arranged in bi-linear series. It is probably common all through the West Indies, but in the absence of the rootstock other species are often mistaken for it in Herbaria. The plant figured by Eaton in his ferns of N. America is true and the figure well illustrates the species.—Florida and Texas to Brazil.

69. *N. molle*, DESV.—*Rootstock* erect, an inch or less thick. *Stipites* erect, 1–2 ft. l. not or very slightly channelled, with a few deciduous scales at base. *Fronde* oblong or ovate lanceolate  $1\frac{1}{2}$ – $2\frac{1}{2}$  ft. l. 6–10 in. w. pellucid papyraceo-herbaceous and flaccid, pubescent, light green. *Pinnæ* spreading horizontally 4–6 in. l.  $\frac{3}{4}$  in. w. sessile, close or more or less distant especially below, oblong-lanceolate with a serrato-acuminate point, 1–3 lowest pair more or less often little reduced and deflexed, pinnatifid  $\frac{3}{4}$  or  $\frac{4}{5}$  to the costæ; Segments close, oblong, often sub-falcate, flat and bluntish,  $\frac{1}{4}$  in. l. from the acute sinus  $1\frac{1}{2}$  li. b. basal pair largest, margins even or sub-crenulate. *Rachis* stramineous, grayish pubescent. *Veins* simple 7–9 to a side, the lowest pair forming a narrow arched areole and sending a distinct branch to the sinus above which the next pair terminates. *Sori* medial; involucre as large, pale, pubescent. *N. molle* Desv. Sl. t. 50, fig. 2, hierb.

Jamaica; common in open and half over-grown places up to 3,000 ft. altitude, or higher, and generally diffused through the island. St. Vincent, Trinidad, probably all through the West Indies. Guiana; common in open places. As in *stipulare* the basal pinnules of the lower pinnæ are often enlarged and pinnatifid. I have under those species pointed out that from *stipulare* this is distinguished by the lowest veins sending a simple branch to the sinus from their anastomosis (not running together thereto) and from *patens*, its other ally, by the same character and the erect rootstock, the texture of this is perhaps softest of the group.—Most tropical and sub-tropical countries of the globe.



70. *N. dejectum*, JENM.—*Stipites* strong, erect, subquadrate stramineous slightly puberulous channelled  $1\frac{1}{2}$ – $2\frac{1}{2}$  ft. l. *Fronde*s erect pinnate, subcoriaceous dark green paler beneath, striated, 2–3 ft. l., 10–15 in. w., the acuminate apex pinnatifid, the base very slightly reduced; rachis strong and with the mid-ribs stramineous and channelled, pinnæ truncate, sessile, subproximate and spreading in the upper half, distant deflexed and shortly stipitate and subcuneate at the base in the lower 6–8 in. l.,  $1\frac{1}{2}$  w., tapering to a finely acuminate entire point  $1\frac{1}{2}$  in. l., cut a third to half way to the mid-rib into broadly rounded oblique or subfalcate open lobes  $\frac{1}{4}$  in. w. with a narrow sinus between and sub-crenulate or even margins. *Veins* conspicuous on both surfaces, close, simple curved, 10–15 to a side all fertile, the lowest 3–5, opposite pairs uniting and running together to the sinus with a streak between and with the costæ, gray puberulous beneath; *Sori* small, medial or nearer the rib reaching from the costæ to the apex of the lobes; involucre small gray puberulous.

In the region of Malali, Demerara River; frequent in moist situations. A fine robust species of the size and habit of *tetragonum* and *Leprieurii* of the *Lastrea* group, marked particularly by the distant sharply deflected pinnæ of this lower half of the fronds, stramineous vascular parts and striation of both surfaces caused by the close, raised veins the lowest pair of which on one or both sides of the mid-rib unite together at the ends forming an elongated loop, as in *Pleocnemia*. From the united lobes at the top of the fronds the pinnæ gradually widen apart downwards to the base where the distance reaches four to five inches.

71. *N. pedatum*, HOOK.—*Rootstock*, short, erect clothed with dark brown subulate scales. *Stipites* tufted, erect, 3–7 in. l. channelled dark brown or ebeneous, polished clothed at the base like the rootstock, copiously pellucid-dotted, coriaceous naked, the upperside very dark green under paler. *Fronde*s cordate subdeltoid 3–6 in. each way, tri-partite, the central division largest and more or less deeply cut into broad oblong blunt or acute lobes; lateral divisions deeper on the inferior side, and these pinnatifid like the central one, the superior side being shallowly lobed or sinuate, lobes  $\frac{1}{2}$ – $\frac{3}{4}$  in. w. the lower ones 1–2 in. l. costal ribs flexuose prominent but evanescent outwards. *Veins*, immersed, pinnate in the lobes the branches simple or forked, terminating short of the edge of the margin or casually uniting. *Sori* medial terminal on a veinlet, involucre dark coriaceous. Hooker and Baker, Syn. Fil. p. 259. *Aspidium*, Desv. Gr. Fil. B.W.I. p. 695.

Jamaica; infrequent on rocks in moist woods from 2000–4000 ft. altitude. Doll River, and Parish of Portland. The fronds vary from subentire to trilobed to the state described. The largest are cut quite to the rachis which is free a  $\frac{1}{4}$ – $\frac{1}{2}$  an inch at the base of the central division generally however it is winged there. The substance though pellucid becomes opaque usually in drying; casually the branches of the inferior veins which do not run to the margin curve and unite at their tips forming large interior areolæ. The aspect of the plant is that of young *Aspidium trifoliatum* but the substance is thicker.—Cuba to Hayti.

72. *N. Murrayii*, JENM.—*Stipites* erect, channelled bright glossy, castaneous or paler brown. *Fronde*s erect 1– $1\frac{1}{2}$  ft. l. 8–12 in. b. membrano chartaceous, pellucid dark green, glabrous, consisting of a large terminal ovate or ovate-oblong lobed or sinuate-margined

segment 8-10 in. l. 4 in. b. with a cuneate base and two pair of opposite lateral pinnae, the upper of which are entire fully adnate to the rachis and often not entirely free of the terminal segment; the lower pair distant with the free bright polished channelled rachis between much larger, stipitate with a large lobe on the underside at the base and the margins especially the inferior more or less sinuate.

Primary veins conspicuous beneath but slender and flexuose  $\frac{1}{2}$ - $\frac{3}{4}$  in. apart areolae copious, fine with free excluded divergent branches. Sori copious, forming a line each side of the primary veins and also scattered between. Involucres fugacious. *Aspidium*, Baker.

St. Lucia; H. B. Murray, Gray n. 4. *N. Sherringii* and *N. Purdiei* are closely allied species, and they are all distinguished from their allies *N. macrophyllum* and *Aspidium trifoliatum* by their scattered instead of serial sori. Mr. Baker placed this in *Aspidium* but in my opinion the sori are too ripe to determine the genus satisfactorily.—Endemic.

73. *N. Purdiei*, JENM.—*Stipites* stout, erect, 1-1 $\frac{1}{2}$  ft. l. glossy brown or castaneous as are also the rachis and ribs. Fronds erect 1 $\frac{1}{2}$ -2 $\frac{1}{2}$  ft. l. or more,  $\frac{3}{4}$ -1 ft. w. pinnate, chartaceous, pellucid, glabrous, dark green, composed of a large terminal tri-lobed or ovate-oblong and acuminate segment a span to a foot l. 8 in. w. more or less deeply lobed at the base, above sinuated or lobed, the apex plain; and two or more pairs of sub-distant, oblong, lanceolate acuminate up-curved lateral pinnae, the lowest of which are petiolate to 1 or 1 $\frac{1}{2}$  in.  $\frac{1}{2}$ -1 ft. l. 3-6 in w. the margins sinuated or lobed the base deeply lobed on each side the lobes being sometimes quite free, upper pairs sinuated or lobate sessile or shortly stipitate the base often deeply lobed and somewhat rounded, primary veins costate  $\frac{1}{3}$  to  $\frac{1}{2}$  in. a part, very oblique connected by a very copious fine areolation containing more or less free included veinlets. Sori very copious, moderately small, irregularly serial on each side of the main veins, and more or less scattered between. Involucres reniform curling with age, receptacles persistent.

Trinidad; collected by Purdie at Maraval. In conformation this resembles *Aspidium macrophyllum* Sw. from which it is distinguished by its copious and scattered (not bi-serial) sori.

Sub-species 1. *variabilis*.—Fronds bi-tripinnatifid or fully tripinnate at the base  $\frac{3}{4}$ -1 $\frac{1}{2}$  ft. l. 4 in. to a foot w. broadest at the base thence reduced outwards. Basal pinnae largest, but usually not unduly enlarged in relation to the next and mostly deeper on the inferior side.—Hook. Sp. Fl. p. 140.

Guiana; common on the banks of creeks, of Macouria River and at the head of the Pomeroon River. The creeping rootstock is about as thick as a pencil and extends often several inches long, with the fronds at the end of it, just as in the type. It differs in the shape and conformation of the frond which is relatively longer and not tri-partite, the basal pinnae as a rule being not unduly enlarged though in this they are variable the rest numerous and all gradually diminishing in size to the end of the frond. The final segments in both are alike.—Brazil and Tropical Africa.

74. *N. macrophyllum*, SWARTZ.—Rootstock stout, erect, *Stipites* caespitose, erect strong 1-2 ft. l. brown or purplish with a few deciduous scales chiefly at the base. Fronds erect oblong pinnate, 1-2 $\frac{1}{2}$  ft. l. from less than 1-2 ft. w. chartaceous, the surface repand usually naked light or dark green paler beneath. Pinnae 2-6 in. or

more usually, large distant pairs horizontal or erecto-spreading acuminate 8-12 in. l. 1-3 in. w. the lowest pair not shortened and shortly stipitate or sessile forked, inferior divisions the shorter, the midrib below the fork devoid of membrane on the inferior side at the base, upper pinnae more or less adnate at the base, specially in the lower side of the midrib, those below these rounded and free not often lobed, terminal division large, decurrent tripartite generally the central segment largest and often deeply lobed. Margins repand or sinuato-lobate. Main veins costæform curving and evanescent at the margins  $\frac{1}{4}$ - $\frac{1}{2}$  in. apart the areolation fine with free included veinlets. *Sori* biserial between the primary veins contiguous to and parallel therewith reniform—orbicular persistent.—Pl. Fil. t. 145 Hooker and Baker Syn. Fil. p. 300, *Aspidium*, Sw. Gr. Fl. B.W.I., p. 694.

*A. var. pilosum*.—Both surfaces freely pubescent, including both rachis and stipe. *Cardiochloena pilosa*, Fée. Sl. Hb. p. 98.

*B. var. viviparum*.—Pinnae more numerous, mostly viviparous near the base on the upper and superior side; the lower ones lobed on both sides, pinnatifid or fully pinnate at the base.

Jamaica, Dominica, St. Vincent, Trinidad, Guiana; common in woods and forests and half open places at low elevations. Variable in size and in the number lobing and size of the pinnae. The forked basal pair have often a small lobe or lobes on one or both sides of the main divisions and this incipient lobing sometimes extends to the two or three pair next above them. *A* was gathered by Miss Taylor in Jamaica, her specimen which I have, is densely pilose but otherwise does not differ from the type. This form is found also in Brazil. *B* is very abundant along some of the Guiana Rivers the Pomeroon and its tributaries especially. The proliferous habit which it has developed in its aquatic home is a striking feature, the plant usually supporting numerous young more or less developed plants on their leaves. The pinnae too are more numerous and deeply lobed on both sides than the type from which otherwise it does not differ, this form is also found in Mexico.—Cuba, and French Islands, Mexico to Brazil.

75. *N. cicutarium*, Swartz.—*Rootstock*  $\frac{1}{4}$ - $\frac{1}{2}$  in. thick shortly elongated and repent, coated with small brown scales; *Stipites* tufted spreading 2-6 in. l., slender, slightly deciduously scaly and puberulous; *Fronde*s prostrate oblong acuminate 6-15 in. l., 2-6 in. w., usually broadest at the shoulders and a little narrowed toward the base, membranaceous-chartaceous pellucid, glabrescent, the ribs slightly pubescent dark green. *Pinnae* distant below the pinnatifid apex opposite spreading deeper on the inferior side 1-3 $\frac{1}{2}$  in. l.,  $\frac{1}{2}$ -1 $\frac{1}{2}$  in. w., lobed or deeply pinnatifid or the inferior shortly petiolate ones fully pinnate at the base; segments spreading decurrent with a rounded oblique sinus and their own width or more between them blunt, repand, sinuate or lobate  $\frac{1}{2}$ -1 in. l., from the sinus  $\frac{1}{4}$ - $\frac{1}{2}$  in. w. *Rachis* slender puberulous; viviparous in the axil of one of the central or upper pinnae. *Veins* copiously areolated without free included branches. *Sori* biserial in the lobes often extending round the sinuses confined usually to the upper half of the frond. Involucres reniform orbicular. Sl. Herb. p. 99. pl. Fil. t. 150. *Aspidium hipprocrepis*, Sw., *Polypodium*, L.

Jamaica; common on dry banks and rocks, in several parts of the country below 2,000 ft. altitude. In Trinidad is a small form in which the fronds are only three or four inches long and one or two wide fully pinnate only at the base the pinnae simply lobed or sinuate, with the exterior vein—branches free

and the surface and rachises more pubescent. *Polypodium* (*Dictyopteris cicuta-riodes*) Baker. Gathered by Miss Taylor in St. George's Parish, Jamaica, is this, devoid of an involucre pubescent. In the larger state the pinnae are 2-3 inches apart; of this there is a quite glabrous form. Differs from the next, which is united with it in the *Synopsis Filicum* by its less compound state small size and prostrate habit.—West Indies, Mexico, Panama, Ecuador.

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76. *N. apiifolium*, SCHK.—*Rootstock* very stout, erect, often a foot or more high, the crown dotted with brown scales. *Stipites* caespitose, erect, naked except at the base,  $1\frac{1}{2}$ - $2\frac{1}{2}$  ft. l. *Fronde* erect, ample, 2-3 ft. l.,  $1\frac{1}{4}$ - $1\frac{3}{4}$  ft. w., bi-pinnate and again pinnatifid as wide, or widest at the base; the apex acuminate and pinnatifid chartaceous glabrous, the ribs rusty above dark glossy green, papillose on the upper side. *Pinnae* spreading opposite petioled  $\frac{1}{4}$ -1 in. oblong acuminate  $1-1\frac{1}{2}$  ft. l. 4-8 in w. deeply pinnatifid or fully pinnate at the base; *Pinnulae* oblong lanceolate 2-5 in. l.,  $\frac{1}{2}$ - $1\frac{1}{4}$  in. w. the larger acuminate, decurrent at the base and more or less apart, lobed or pinnatifid from  $\frac{1}{3}$ - $\frac{3}{4}$  deep, lobes 2-4 l. w.  $\frac{1}{4}$ - $\frac{3}{4}$  in. l. blunt or rounded. *Rachis* strong channelled naked. *Veins* freely areolated. *Sori* biserial in the lobes, sunk; involucre reniform-orbicular, persistent.—*A. dilaceratum*, Kunze, Mett. Sl. Hb. p. 157, 158, 159, Gr. Fl. B.W.I., p. 695.

Jamaica; common and widely diffused through the country in wet rocks in woods or shady places, abundant in the eastern and central parishes. The sori are chiefly on free included appendages, the other areolae being devoid of veinlets. The papillose surface is a striking feature in the growing plants. The upper pinnae are adnate to the rachis and the higher ones decurrent. All the segments but the ultimate lobes are sharp.—West Indies, India, Guatemala, Pacific Islands, Massarene Isles and East Africa.

## GENUS XXVII.—NEPHROLEPIS.

*Nephrolepis*, SCHOTT.—*Sori* reniform or roundish, receptacle punctiform, terminal on the anterior veinlets, semi-serial, and medial or intra, or sub-marginal. *Involucres* superior, scale-like, reniform or reniform orbicular, attached by the sinus and free around the edges. *Fronde*s simply pinnate; pinnae oblong or linear-oblong, articulate and deciduous; *Veins*, not reaching the margins forked with clavate apices, which on the upper surface are often dotted with cretaceous scales. *Rootstock* freely stoloniferous with wiry flexuose roots, which in some species, bear abundant small potatoe-like tubers beneath the surface of the soil.

There are some eight to a dozen variable species in this genus; the restricted number of the species however being fully made up for the multiplicity of the individuals. It is what is called a natural genus—that is, the several species have a general aspect in common which is unmistakable whether the plant be in forest or not.

In the technical characters of the fructifications the genus does not differ much from *Nephrodium* their peculiar homology of habit and aspect being in part the principal generic characteristics. All prefer sunny situations, occupying open ground, rocks, and banks ascending the bases of trees, aloft, on their branches, with bromeliads and other plants, and in the crowns of certain palms. The sori are either oblique or transverse with the veins that bear them.

Pinnae unequilateral or dentate-cordate at the base.

Fronde 1–2 in. w.

1. *N. pectinata*, Schott.

Fronde 2–4 in. w.

2. *N. sesquipedale*, Jenm.

Pinnae equilateral or fully cordate at the base.

Fronde 1–2 in. w.

3. *N. cordifolia*, Presl.

Fronde 3–8 in. w.

4. *N. exaltata*, Schott.

5. *N. biserrata*, Schott.

1. *N. pectinata*, SCHOTT.—*Stipites* tufted, hardly any to 3–4 in. l. light brown, or straw coloured, with spreading flexuose wiry-like, coloured stolons superficial on the surface around *root*, devoid of tubers; fronds erect, a span to 18 in. l.  $\frac{1}{2}$ – $1\frac{3}{4}$  in. w. naked, light green, thin; *Pinnae* oblong sessile, articulate often cretaceous dotted,  $\frac{1}{4}$ – $\frac{3}{4}$  in. l. 2–3 l. w. dentate rounded, superior base, expanded into a deltoid auricle, inferior shortly cut-away to the pedicel; *rachises* nearly or quite naked, slender, channelled, light brown or stramineous; veins forked, sori submarginal, transverse, broadly reniform; involucres pale, shield-like persistent.

Jamaica; abounding from 2,000 ft. altitude upwards on banks of open stony acres and in coffee fields universally plentiful in the mid regions over the greater part of the open higher ground of the Colony. Generally it is much more slender, smaller and paler than *cordifolia* with which it is sometimes united. Common with fronds  $\frac{1}{2}$ –1 in. w. and only a few inches high, quite fertile the curvature of the inferior base of the pinnae to the point of attachment more slender more naked, stipes and rachises, and absence of tubers to the roots clearly marked.

Ad. Schott 1705

(A.) *Sub. sp. pendula*.—Much stronger fronds 2–4 ft. l. 2–3½ in. b., pinnae acuminate, often falcate serrate 1½ in. l., base auricled on both sides, that of the superior deltoid or developed into an acute point, the under truncate. *N. pendula* Pr. *Aspidium pendulum* Radd. Fil. Bros., p. 30, t. 45.

The much larger size, pendulous habit, narrow acuminate segments that are auricled on both sides of the base are its distinguishing characters.

2. *N. sesquipedale*, JENM.—*Rootstock* erect slender, with numerous superficial brown wiry stolons spreading from it. *Stipites* strong erect, or spreading slightly scaly eventually naked, dark brown channelled. *Rachis* stiff, brown channelled, deciduously paleaceous beneath, furfuraceous down the face. *Fronde*s pinnate, chartaceous dark green, naked, 2–4 or more ft. l., 2½–4 in. w., uniformly narrowed to the base. *Pinnæ* numerous, close, spreading usually more or less up-curved at the end, serrate in the outer half, plain edged within obtuse or acute 1½–2 in l., 3–4 li. w., the inferior base narrowed and cut away with a curve to the axis. Superior expanded into a deltoid. auricle. *Veins* apical on the shorter anterior veinlet (not transverse) and slightly nearer the rib than margins. *Involucres* reniform with a narrow sinus. *Aspidium* WILLD.

Jamaica; gathered on high rocky banks, where it is plentiful on the slope of Stony Hill, at about 800 feet altitude. In size and general habit and aspect this resembles *exaltata*, but different character of the sori, which at once catches the eye of the collector familiar with the genus, and the uniform contraction of the inferior base of the pinnae, clearly distinguish it. I cannot find that under Willdenow's specific name *sesquipedale* it has ever been removed from *Aspidium*. In Guiana this is the commonest species, abounding in great profusion in the decaying debris of spathes and spadices under the lofty crowns of *Maximiliana regia*. Common in same position in Government House Gardens, Trinidad.

3. *N. cordifolia*, PRESL.—*Rootstock* slender, erect, stoloniferous, the wiry flexuose roots bearing subterraneous ovoid potato-like tubers. *Stipites* strong, erect, tufted, 2–6 in. l., clothed with deciduous rather matted fibrillose tomentum. *Fronde*s, erect, curved, 1–2 ft. l., 1¼–2½ in. w., narrowed at the base, firm and rather opaque, bright or dark green. *Rachis* stiff, channelled polished dark brown, freely deciduously fibrillose, ultimately devoid of pinnae. Surfaces otherwise naked. *Pinnæ* very numerous, close and often imbricating horizontal and converging forward in growth 1–1¼ in. l., 4–5 li. b., sessile, rather cordate at the base, the upper side dilated into triangular auricle over-lapping the rachis, inferior rounded, obtuse or acute, margins entire or serrulate, sori medial broader than deep; involucres pale, oblique or transverse with the margin, with a broad sinus, at length semilunar.—Baker Pl. Fil. t., 64.—*N. tuberosa*, Hook.

Jamaica; abundant at 4,000–6,000 ft. altitude, on banks, rocks, open ground and in light woods. With the growing fronds stand the stily erect tapering rachises of past ones from which all the pinnae have fallen. The vestiture of the stipites and rachises though abundant at first is transient leaving the fronds in age, quite naked. A plant is found occasionally with fronds dichotomously forked or faciated at the apex and the ends of the pinnae. The species has a triple multiplication 1, by spores; 2, by stolons, spreading wide over the surface, and 3, by the abundant subterranean tubers.

4. *N. exaltata*, SCHOTT.—*Stipites* tufted strong 6–12 in. l. deciduously fibrillose with fulvous scales glossy, dark coloured. *Fronde*s, pliant, 2–6 ft. l. 3–5 in. w., firm glabrous, and bright green. *Rachis* channelled more or less deciduously fibrillose, or tomentose, glossy. *Pinnæ* numerous close and often imbricating, usually distant below sessile and subcordate at the base with a distinct auricle on both sides, the upper one larger and deltoid, the lower rounded  $1\frac{1}{2}$ –3 in. l., 4–6 l. w. blunt or pointed often subfalcate; *Margins* serrulate with appressed teeth; *Veins* obscure, once or twice forked, midrib immersed. Sori nearer the margins than midrib, rather sunk in the surface; oblique and with the shield-like involucre cordate or orbicular, the sinus deeper than broad.—Hooker and Baker, Syn. Fil. p. 301. *Aspidium* Swartz. Gr. Fl., B.W.I., p. 688.

Jamaica; common ascending to 3,000 ft. altitude growing on banks about the trunks of trees and on heads of palms spreading freely and often ascending a considerable height by the stoloniferous shoots. *Pinnæ* when prolonged more sharply serrated at the end, at length deciduous and sometimes bearing a juxta-marginal line of cretaceous dots over the sori on the upper side. This is the common and abundant species of the lower elevations. The habit is weak and prostrate or pendent.—Pl. Fil. t. 63. Sl. t. 31., Plts. 22, *Poly-podium* Linn. *Aspidium*, SWARTZ, Eat.

Jenman once made *N. sesquipedale*, Jenm. a sub species of *N. exaltata* but afterwards made it a substantive species.—(ED.)

5. *N. biserrata*, SCHOTT.—*Stipites* strong, erect-tufted, 6–10 in. l. polished, slightly fibrillose or furfuraceous. *Fronde*s 2–4 ft. l. 6–10 in. w., narrowed at the base. *Pinnæ* numerous, spreading horizontally linear-lanceolate and acuminate approximate or sub-distant, truncate, or rather rounded (or in the inferior subcordate.) Slightly disposed to be auricled on both sides, *Margins* variable, serrulate, even or bi-crenate serrate, *Rachis* strong, glossy, channelled deciduously furfuraceous, chartaceous, or membranous, bright, often pale green, naked, puberulous or slightly pubescent when young. *Veins* twice forked, mid-rib strong channelled. *Sori* intra-marginal punctiform, *Sporangia* yellowish when ripe; involucre small, naked or ciliate ultimately cordate orbicular. Pl. Fil. t. 112. Presl. *N. Acuta*, Presl. and several other names, *Aspidium punctulatum*, Swartz.

Plentiful among bushes on banks, and trees among the lower hills. A much larger plant than the preceding, of erect spreading or pendent habit, growing more or less in mosses. It varies much in size and in vestiture of the surface. There is a pubescent form with *pinnæ* only 4–5 l. w., more deeply and uniformly serrulate, and often furcate, the sori submarginal. The upper surface is papillose over the sori.

## GENUS XXVIII.—OLEANDRA, Cav.

*Sori* round, dot-like scattered or in irregular transverse lines on the back of the veins, more plentifully towards the costæ. *Involucre*s superior cordate-orbicular, attached by the sinus, free around the edge. *Fronde*s entire naked or ciliate with a satiny gloss. *Stipites* articulated spreading at a wide angle. *Veins* free. *Rootstock* long, repent.

This genus like the preceding depends upon the homology and distinct habit and physiognomy of its members, in the absence of any distinguishing characters of fructification to give it generic recognition. It contains a score or

so of species, and varieties, which inhabit rocks, prostrate trunks of decaying trees, the crowns of palms and similar situations and are scattered over the tropical and warm regions of the world, reaching southward to Australia.

1. *O. nodosa*, PRESL.—*Rootstock* repent, prostrate, extending often several feet long, firm cylindrical, not so thick as a quill, branched, clothed with copious silky fine squarrose ferruginous scales. *Stipites* distant, slender, polished, dark-coloured, 4–6 in. l., the raised articulate point  $\frac{1}{4}$ – $\frac{1}{2}$  in. from the base. *Fronde*s oblong-lanceolate acuminate or cuspidate, the point fine, 10–18 in. l.,  $1\frac{1}{2}$ –3 in. w., the base tapering or cuneate; margins often repand entire, cartilaginous-edged; chartaceous pellucid a light satiny green, with a few deciduous scattered minute scales along the costa beneath. *Veins* fine, very close, simple or once forked from near the base; nearly horizontal. *Sori* copious, scattered but most crowded near the dark coloured glossy costa, which is channelled down the face. *Involucres* dark-brown naked. Pl. Fil. t. 136. *Aspidium* Willd.

Jamaica; very common in shady and open places and forests trailing over rocks and decaying logs from 1,000–3,000 or 4,000 feet altitude. The fronds part at the articulation and drop leaving the base of the stipe adherent to the rootstock. In this the rootstock is horizontal in growth while in the other American species it is erect. *O. neriiformis*, Cav. has erect rootstocks with the joint of the petioles at the base and with smooth or hairy surfaces.—Trinidad, West Indian Islands, Guiana.

2. *O. neriiformis*; CAV.—*Rootstock* erect, firm, cylindric, hardly so thick as a quill concealed beneath the appressed coating of linear tawny scales, long, extending and branched. *Stipites* contiguous, articulated at or near the base  $\frac{1}{2}$ – $1\frac{1}{2}$  in. l. *Fronde*s 1– $1\frac{1}{2}$  ft. l.,  $1\frac{1}{2}$ –3 in. w., entire, the base cuneate, the part acute, acuminate or cuspidate, papyraceous, silky green, ciliate chiefly on the midrib, the somewhat uneven margin, and beneath. *Veins* free, very fine and close, forked and simple, spreading at a wide angle. *Sori* dorsal, small, rather copious, scattered near the midrib, involucres cordate. Hooker and Baker, Syn. Fil. p. 302. Hook—Fil. Exot. t. 58.

Guiana; gathered by all collectors most abundant in the forest of the Conji River on the tops of the Cocorite (*Maximilliana regia*) trees. Differs from the preceding species by the appressed and much larger ciliate edged scales of the rootstock which is vertical in growth, leaving the fronds in a tuft at the top, the shorter petioles jointed quite at the base, and the ciliate surface. Trinidad, New Granada, to Brazil and Peru, India, Malay Archipelago and West Trop. Africa.

## GENUS XXIX.—FADYENIA, Hook.

*Fadyenia*, Hook.—*Fronde*s acaulose, entire, dimorphous, *Veins* areolated. *Receptacles* oblong, on free included veinlets. *Sori* large, deeper than broad, oblong reniform, with a deep sinus and converging auricles; *involucres* ample, attached interiorly, the exterior edge free.

A monotypic genus found only in Jamaica and Cuba. The sori are several times larger than in any other genus of the tribe, being  $1\frac{1}{2}$ –2 l. l. by  $1\frac{1}{2}$  l. w., doubled in the form of a horse shoe, on an elongated receptacle, the folded ends converging almost together at the base. Occasionally, the veinlet extends beyond the sinus to the other side of the mesh.



1. *F. prolifera*, Hook.—*Rootstock*, small fibrous rooted, simple entire; *Fronde* caspitose with hardly any distinct stipites, fibrillose at the tapering base; barren prostrate, narrowed both ways from the centre, outwards into a much elongated tapering tail proliferous and rooting at the summit,  $\frac{3}{4}$ –1 in. w., 3–7 in. l., fertile, erect, oblanceolate, rounded at the summit in the sterile lower half to the long tapering base, 4–6 in. l., 4–5 l. w., both fronds naked, dark green; membrano-chartaceous, costal areolæ large, exterior smaller with free branches along the margins; *Sori* uniserial between the mid-rib and edge, usually confined to the costal meshes; *involucres* persistent at length shrivelling.—Sl. t. 26, f. 1, Hook. & Gr. Ic. t. 96. Hook. Gen. t., 53 B. *Asplenium*, Sw. *Aspidium*, Mett.

Jamaica; infrequent on wet banks in the eastern parishes up to 2,000 feet altitude. In the barren fronds it resembles *Aspidium rhizophyllum*. The earlier fronds are oblanceolate; the next rather ovate-lanceolate extending into a much elongated winged tail a line or less wider at the radicans summit. In the fertile this is reversed, they taper similarly, but inwards, to the base, and only the broader outer part is fertile, occasionally an odd reduced sorus is produced in one of the smaller outer meshes, most of the space between the mid-rib and margin is taken up by the sori, which run more or less parallel therewith.

## SERIES II.—EXINVOLUCRATÆ.

(*Sori devoid of involucres.*)

### GENUS XXX.—TRIBE XI—POLYPODIEÆ.

*Sori* round or oval, rarely linear or decurrent and confluent, usually smaller than a pin's head but often larger. Receptacles the same shape on the back or terminal on the veins. *Sporangia* stipitate, compressed arched by an incomplete jointed vertical band which splits at length transversely; *Involucres* none; *Veins* free, united or variously anastomosing with or without free included branches in the meshes. *Fronde* free or many varying from simple entire to decomposed; *Stipites* articulated or not, paced or tufted on a creeping or upright rootstock, the variations and diversity in which are as wide as in the character of the fronds.

A very extensive group, comprising in its numbers great variety of habit and form but which as here regarded constitutes but a single composite genus, distinguished by the naked exposed usually isolated roundish sori, in all cases devoid in any degree of an involucre.

*Polypodium Linn.*—Only Genus; see character of Tribe.

The largest genus of all in the order. Spread over the tropical and temperate Zones of both hemispheres most abundant at high elevations within the equatorial belt. The majority epiphytal, affecting the shady moist situations of the cool higher mountain regions.

Veins free; Fronds entire or furcate.—Sp. 1–6.

Sori round.

1. *P. furcatum*.
2. *P. Fawcettii*.
3. *P. dendricolum*.
4. *P. gramineum*.
5. *P. nigro-limbatum*.
6. *P. marginellum*.

Fronds serrate or lobate in the lower half, or serrato—entire in the upper.—Sp. 7–9.

- 7. *P. serrulatum*.
- 8. *P. Jamesonii*.
- 9. *P. myosuroides*.

Fronds uniformly lobed pinnatifid or pinnate.

Segments monosorus.—Sp. 10–18.

- 10. *P. Sherringii*.
- 11. *P. nimbatum*.
- 12. *P. exigium*.
- 13. *P. trichomanoides*.
- 14. *P. basi-attenuatum*.
- 15. *P. trunciola*.
- 16. *P. tœnifolium*.
- 17. *P. nutatum*.
- 18. *P. Hartii*.

Segments polysorus.

Fronds tapering at the base, subsessile or petioles not exceeding  $1\frac{1}{2}$  in. l.

Fronds under 6–9, li. w.—Sp. 19–27.

- 19. *P. Sendallianum*.
- 20. *P. moniliforme*.
- 21. *P. saxicolum*.
- 22. *P. albo-punctatum*.
- 23. *P. mazarunianum*.
- 24. *P. jubæforme*.
- 25. *P. subtile*.
- 26. *P. kaïeteurum*.
- 27. *P. Kigelianum*.

Fronds from  $\frac{1}{2}$  to  $1\frac{1}{4}$  in. w.—Sp. 28–35.

- 28. *P. discolor*.
- 29. *P. rigescens*.
- 30. *P. tovarense*.
- 31. *P. heterotrichum*.
- 32. *P. pendulum*.
- 33. *P. granadense*.
- 34. *P. subsessile*.
- 35. *P. lasiolepis*.

Fronds from  $\frac{3}{4}$ –2 in. w. or over.—Sp. 36–39.

- 36. *P. cultratum*.
- 37. *P. zanthotrichum*.
- 38. *P. cappillare*.
- 39. *P. graveolens*.

Fronds not, or little, reduced at the base, petioles several in. l.

Fronde  $\frac{3}{4}$ -3 in. w.—Sp. 40-51.

40. *P. curvatum*.
41. *P. ottites*.
42. *P. trifurcatum*.
43. *P. Eggersii*.
44. *P. suspensum*.
45. *P. asplenifolium*.
46. *P. bruno-vivide*.
47. *P. Rookenaamæ*.
48. *P. Kalbreyii*.
49. *P. firmum*.
50. *P. apiculatum*.
51. *P. taxifolium*.

Fronde 1-6 in. w.—Sp. 52-56.

52. *P. plumula*.
53. *P. pectinatum*.
54. *P. paradiseæ*.
55. *P. simile*.
56. *P. dissimile*.

Fronde pinnate petioles winged to the base.—Sp. 57-58.

57. *P. microchasmum*.
58. *P. plebeium*.

Fronde bi-pinnatifid.—Sp. 59-60.

59. *P. melanotrichum*.
60. *P. xiphopteroidæfolium*.

Fronde not articulated at the base of the stipe pinnate or bi-pinnate.

Fronde simply pinnate.—Sp. 61-64.

61. *P. hastæfolium*.
62. *P. blechnoides*.
63. *P. trinitensis*.
64. *P. flavopunctatum*.

For allied plants see *Nephrodium* and *Gymmogramme*.

Fronde bi-pinnatifid.—Sp. 65-76.

65. *P. tijucanum*.
66. *P. refulgens*.
67. *P. pubescens*.
68. *P. gracilentum*.
69. *P. roramense*.
70. *P. demeraranum*.
71. *P. bi-pinnatifidum*.
72. *P. ctenoides*.
73. *P. Percivalli*.
74. *P. Thomsonii*.
75. *P. decussatum*.
76. *P. caudatum*.

Fronde decompose.—Sp. 77-78.

77. *P. punctatum*.
78. *P. rugulosum*.

Veins united. Fronde not articulated at the base of the stipe.—*Goniopteris*, Presl.

Fronds pinnate or bi-pinnatifid opposite veins uniting with a branch running to the sinus.—Sp. 79–83.

79. *P. ingrescentium*.

80. *P. obliteratum*.

81. *P. crenatum*.

82. *P. androgynum*.

83. *P. tetragonum*.

Fronds pinnate main veins costate areolæ fine copious.—Sp. 84.

84. *P. Plumieri*.

Fronds articulated at the base of the stipe, leaving a clean scar at parting.

Fronds pinnatifid or pinnate.

Fronds coated with matted scales.

Veins areolate in 1–2 series with free exterior branches.—Sp. 85–88.

85. *P. incanum*.

86. *P. thyssanolepis*.

87. *P. squamatum*.

88. *P. lepidopteris*.

Veins areolated, hexagonal in one to several series, with usually rather stronger primary veins running from the costæ to the margin exterior branches free, sori terminal on free included veinlets.

*Goniophlebium*, Blume—Sp. 89–97.

89. *P. loriceum*.

90. *P. chnoodes*.

91. *P. attenuatum*.

92. *P. nerifolium*.

93. *P. meniscifolium*.

94. *P. adnatum*.

95. *P. fraxinifolium*.

96. *P. sarrucuchense*.

97. *P. remotum*.

Veins forming copious narrow elongated angled areolæ with or without stronger primary veins ; Costal series transverse to the rest, sori terminal on simple or united included veinlets or compital.

*Phlebodium*, R. Br.—Sp. 98–99.

98. *P. aureum*.

99. *P. decumanum*.

Areolæ 1–2—Serial pinnae linear.

*Pleopeltis*, Humboldt.—Sp. 100.

100. *P. petrafolium*.

Fronds simple entire.

Primary veins costa form raised parallel, the intervening areolæ fine and uniform.

Sori compital, large uniserial between the primary veins. *Pleuridium* Fée J. Smith.—Sp. 101.

101. *P. crassifolium*.

Primary veins generally as in *Pleuridium* but connected by transverse, mostly areolate slender veins which together form oblong areoles in 2 erect free soriferous branches, divided or not by a slender intermediary veinlet.

*Campyloneuron*—Presl.—Sp. 102–106.

- 102. *P. phyllitidis*.
- 103. *P. costate*.
- 104. *P. lævigatum*.
- 105. *P. repens*.
- 106. *P. angustifolium*.

Veins as in *Goniophlebium*. Sori in 1—several series. Sp. 107.

- 107. *P. glaucophyllum*.

Areolæ copious, not distinctly costate veins, sori uniserial, various genera of authors.

Fronds scaly.—Sp. 108.

- 108. *P. piloselloides*.

Fronds glabrous.—Sp. 109–114.

- 109. *P. vacciniifolium*.
- 110. *P. lycopodioides*.
- 111. *P. chinabowensis*.
- 112. *P. Swartzii*.
- 113. *P. persicariæfolium*.
- 114. *P. Thurnii*.

Fronds scaly.—Sp. 115–117.

- 115. *P. percussum*.
- 116. *P. lanceolatum*.
- 117. *P. megalophyllum*.

Addenda by Editor.

- Polypodium rigens*, Maxon.
- P.*——aromaticum, Maxon.
- P.*——Harrisii, Jen.

1. *P. furcatum*, METT.—*Rootstocks* slender and erect, aggregated in dense fibrous tufts, no distinct stipites, the wings of the fronds extending to the base; *Fronds* coriaceous naked, light green, linear,  $1\frac{1}{2}$ –5 in. long, from  $\frac{1}{2}$  to hardly 1 li. w., simple or once, twice or thrice forked, with divaricating branches; margin entire but undulato-sinuate, rarely dentate, narrowing gradually to the base; Venation composed of dark sinuated filiform mid-rib, with short distant mostly spur-like veins, which are simple and fall much short of the margin. *Sori* distant, large, oblique, irregular, the margin dilated where they occur, the surface of the frond papillose on the upper side. Hooker and Baker Syn. Fil. p. 322. *Grammitis* Hook and Grev. t. 62.

Guiana; very abundant on rocks and trees on the banks of the Potaro and other rivers and extending to Roraima. Gathered in Cayenne by Le Prieuri. The narrowest species of all, only divided by the furcations, generally single, but sometimes repeated again and again in the form of a stag's horn. The veins and sori are very irregular in regard to their distance apart, being in some cases close and regularly alternate, in others distant and those of the opposite sides contiguous. The mid-rib is more or less concealed in the parenchyma, not however constantly beneath and raised on both sides.—Amazon Valley. Spruce.

2. *P. Fawcettii*, BAKER.—*Stipites* tufted, from a slender upright villose rootstock,  $\frac{1}{3}$  of an inch or less, l. dark coloured, filiform, densely villose with spreading brown or reddish hairs; *Fronds* spreading linear ligulate 2– $3\frac{1}{2}$  in. l.,  $1\frac{1}{2}$ –2 li. b, bluntish or rounded at the apex tapering and decurrent at the base; pale yellowish green

thin and flaccid, clothed with fine spreading scattered hairs specially on the mid-rib and margins, the latter slightly repand; *Rachis* filiform, purplish at the base enclosed above this. *Veins* fine, curved, not reaching the edge, with a short anterior soriferous branch; *Sori* round terminal, contiguous but apart, forming a row on each side of the midrib medial or subcostal—*Journ. Bot.* 1885, 270.

Jamaica; infrequent at 4,600–6,000 ft. in damp forests on the trunks and branches of trees distinguished by the simple entire soft-textured fronds which are often curved laterally falcate form. It was first discovered in 1875 at Morce's Gap and on the slopes of John Crow Peak when it was referred to *P. jungermannioides*, Klotzsch, and again in 1889 when it was named after Mr. Fawcett.—Endemic.

3. *P. dendricolum*, JENM.—*Rootstock* very small, erect finely filamentose scaly. *Stipites* 1–2 li. l., densely tufted erect brown, clothed with fine costaneous hair-like scales. *Fronde* simple linear, erect 2–3 in. l., 2 li. w., stiff dark-brown green, under side paler both surfaces ciliate, the margins shallowly scolloped above the plain narrowed base; mid-rib on both surfaces covered by parenchyma. *Veins* fine three-branched in each lobule, spreading, the interior fore-shortened and fertile at the apex. *Sori* one to each scollop. alternate round, medial, apart, superficial, receptacles embossed, dark sub-oblong.—*Gard. Chron.*, Oct. 20th, 1894.

Jamaica; apparently very rare, only one plant having been found by Hart on trees at 5,000 feet altitude in the highest mountain ranges. It differs from the previous species by its erect habit stiff thicker texture, scolloped margins, and three-branched spreading veins.—Endemic.

4. *P. gramineum*, SWARTZ.—*Rootstock* 1–1½ li. thick short, creeping, densely clothed with light brown, somewhat squarrose scales; *Stipites* contiguous, several arising near together, slender puberulous, ¾–1½ in. l. stiff; *Fronde*, linear-acuminate, 3–5 in l. 2–2½ li. w. narrowed and cuneate at the base; tapering and often attenuated at the apex usually more or less curved, stiff and sub-coriaceous, grass green, margin at first slightly ciliate, the surfaces otherwise naked and glossy. *Veins* oblique evident on the upper side forked both branches reaching the marginal thread; *Rachis* filiform, covered. *Sori* oval rather large medial on the superior vein branch sub-parallel with the margin.

Common on trees often in large patches, from 4,000 ft. altitude upwards, marked from its allies, by the horizontal growth of the rootstock narrower, grass-like fronds with distinct petioles medial sori; veins excurrent to the marginal thread which with both veins and midrib is covered by the parenchyma.—West Indies. Guiana.

5. *P. nigro-limbatum*, JENM.—*Rootstock*, small, fibrous, upright or oblique, densely clothed with fine subulate castaneous scales, the roots densely hairy; *Stipites* wiry short, dark-brown; *Fronde* erect, stiff coriaceous, acute or acuminate, long attenuated to the base, 4–10 in. l., 1½ li. w., naked glossy, green, the plain or repand margin-edged with a black glossy thread. *Veins* close, simple straight oblique, clavate not reaching the margin the fertile with a spur near the anterior base causing a slight decurvation of the outer two-thirds, both veins and mid-rib covered by membranes. *Sori* oval,

rather oblique, close forming a double costal series in the upper part of the frond, but rarely reaching the top. *Grammitis nigro-limbata*, Spruce, MS. *G. nimbata*, Fée. Guiana.

Frequent on the upper boughs of trees in damp forest along the higher ridges and peaks from 5,000 or 6,000 ft. altitude alone in places or scattered with the following and nearly as common. The glabrous surface and taper-pointed fronds readily reveal its individuality without the examination of other characters. It has a very wide and clear range in South America.

6. *P. marginellum*, SWARTZ.—*Rootstock* slender erect, elongated, densely clothed with loose subulate brown scales. *Stipites* tufted, stellato-ciliate, under  $\frac{1}{2}$  an in. l., black, winged by the decurrent sides of the frond. *Fronde*s spreading 2-4 in. l., 3-4 in. w., ligulate, gradually tapering at the base, the apex obtuse rounded, as wide or wider there than below, or sometimes narrower, firm but not coriaceous, ciliate especially on the distinct black marginal thread, which in time separates from the membrane. *Rachis* covered. *Veins* immersed, once or twice forked, the inferior branch curved, and sometimes prolonged, to join near the margin—the next inferior one above it, thus forming distinct areolæ that enclose the sori more often however free, not reaching the margin. *Sori* oval, rather large, dark brown, oblique, situated on the shorter superior veinlet or spur near the mid-rib *Grammitis*. Sw.

Jamaica; common on the upper branches of trees in forests at 5,000 to 7,000 feet altitude, marked from the previous species by the different shape of frond form of the venation, and presence of vestiture. In both, the marginal thread is black and glossy, and not covered by parenchyma as in *gramineum*, separating eventually as the fronds decay the veins not entering it, casually the branches of the same vein meet and form a narrow mesh. I have not seen specimens of this from the mainland, those referred to it, belonging to the last.

(A Jamaica specimen in the Editor's collection appears to be nearer, *P. nigro-limbatum*. Svtz.)

7. *P. serrulatum*, METT.—*Rootstock* slender, capillary, with small appressed pale linear scales. *Stipites* slender, close or apart. 1-3 li. l., narrowly winged. *Fronde*s linear, stiff, bright green naked,  $\frac{1}{2}$ -1 li. w. 1-3 in l., the lower part deeply serrated, with open or sub-distant sharp teeth, the upper entire with the sides eventually reflexed or folded together. *Veins* simple, spur-like, stiff, immersed but prominent as on the slender filiform midribs, *Sori* on the decurrent base of the veins of the upper part of the fronds, oblong or at length quite confluent forming a linear costal band. *Grammitis*, Sw.; *Xiphopteris*, Kaulf. Hook. Gard., Ferns t. 44.

Jamaica; common on decaying logs in coffee plantations and on trees in forests from the lowest altitude to the highest peaks. The linear costal sori which is ultimately present suggests affinity with *Pleurogramme*, and to justify its generic separation but the two following allied species clearly connect it with *Polypodium*. The slender filiform erect rootstock reaches 3 in. l. is often branched and throws down prop-like wiry roots to the supporting surface. Casually an odd vein is forked, the pagina is often so little, as to merely form a covering to the central rib and the spur like veins along its sides.—West Indies to Peru.

8. *P. Jamesonii*, JENM.—*Stipites* tufted from a slender, shortly elongated, scaly rootstock, a line to  $\frac{3}{4}$  in. l., dark coloured and slightly ciliate. *Fronde*s  $1\frac{1}{2}$ -3 in. l.,  $1\frac{1}{2}$  li. w., stiff, bright green,

globorescent, puberulous, on the mid-rib beneath; the apex pointed, the base tapering and decurrent, the upper  $\frac{1}{2}$  or  $\frac{1}{3}$  subentire-serrulate, the lower part pinnatifid, with blunt, oblong deltoid, open teeth, all ultimately deciduous, leaving the naked filiform dark rachis. *Veins* conspicuous, rigid, close, simple, hardly reaching the edge, decurved at the base. *Sori* short, basal on the veins early, confluent and covering the rachis—*Xiphopteris*. Hook - 2nd Cent. Fern t. 14.

Jamaica and Guiana; frequent on trees in forests at 6,000-7,000 ft., but much less common than the preceding with a rootstock similar in character but stouter, shorter, and not uniformly vertical, and fronds two and three times as wide, the fertile entire portion usually remaining flat. The sori are at first oval and quite distinct, but at length form a confluent band down the centre, but not reaching the margins.

9. *P. myosuroides*, SWARTZ.—*Rootstock* shortly ascending, clothed with small acuminate reticulated scales. *Stipites* tufted, varying from hardly any clear, to  $\frac{1}{8}$  an in. l., puberulous or slightly ciliate. *Fronde*s 2-4 in. l.,  $1\frac{1}{2}$ -2 l. w. tapering at the base as also but less to the apex, pinnatifid throughout but less deeply in the upper fertile portion; *Segments* nearly deltoid, bluntish, adnate decurrent a line or less deep and half or two-thirds as wide, reduced below to mere teeth; *Rachis* dark coloured slightly ciliate beneath. *Veins* simple not reaching the edge. *Sori* oval, one to each lobe near the midrib in the upper half or two-thirds of the frond, ultimately partially confluent—*P. setosum*, Mett, *Grammitis*, Sw. *Xiphopteris*. Klf.

Jamaica; frequent on the highest ridges and peaks through the Blue Mountain range, hardly found below 6,000 ft. altitude. This has distinctly oval sori, which though partially confluent at last never lose altogether their distinctness. The fronds are less deeply cut in the upper fertile portion and the sori are borne at the base of the connected segments, not out in the lobe.

This species shows the completed transition from characteristic *Xiphopteris* with its decurrent sori into normal *Grammitis* with separate oval sori.

10. *Sherringii*, BAKER.—*Stipites* densely tufted short, if any, clear of the decurrent wings of the fronds, filiform, wiry and blackish. *Fronde*s  $1\frac{1}{2}$ - $2\frac{1}{2}$  in. l., 2- $2\frac{1}{2}$  li. b. the apex blunt and terminated in a lobe narrowed at the base rather pale green clothed with stiff scattered spreading brown hairs, opaque, stiff, cut nearly to the midrib into rounded broadish decurrent lobes with an open oblique sinus between showing a clear wing to the filiform flexuose rachis which is concealed in the pagina. *Sori* solitary, terminal on the spur near the base of the short veins.—*Jour. Botany new series*, Vol. XI, p. 326.

Jamaica; rare at 4,000-5,000 ft. altitude in the Port Royal mountains in the Newton district on branches of forest trees. This resembles *basi-attenuatum* in the entire rounded lobes, decurrent and dwindling at the base of the fronds but is more densely tufted with short stiff coriaceous fronds, which are much less ciliate. The fronds are erect or erecto-spreading, and are so stiff, that in course of time the pagina decays, leaving the rigid black midribs standing mixed with the growing fronds. The rootstock in the specimen before me forms an upright tuft of matted fibre nearly finger thick.—Endemic.



11. *P. nimbatum*. JENM.—*Stipites* densely tufted, short or hardly clear. *Fronde* erect or erecto-spreading, 2–3 in. l.  $1\frac{1}{2}$ –2 li. b. linear, narrowed at the base; the apex bluntish-pointed, deeply pinnatifid. *Segments* close, rounded, entire,  $\frac{3}{4}$  nearly 1 li. d. and b., broadly adnate and confluent at the base, opaque, coriaceous, a dull brownish green villose with spreading hairs; *Rachis*, stiff filiform black, concealed in the pagina which eventually drops from it. *Sori* solitary at the base of the lobes on the spur of the short dark veins, the lurid brown hairs of the receptacles protruding.—*Journ. Bot.*, Vol. XXIV., p. 271.

Jamaica; infrequent above 5,000 feet altitude on trees in forests, most resembling *trichomanoides*, but smaller, stiffer and more densely tufted, with close entire rounded shorter segments which are not lobulate and villose instead of scaly rootstock. The vestiture of growing fronds has a lurid reddish tinge, and they are yellowish green.

12. *P. exiguum*, GRISEB non HEWARD.—*Rootstock* slender, erect, fibrous and scaly. *Stipites* tufted blackish filiform very short. *Fronde*  $\frac{3}{4}$ –2 in. l.  $1-1\frac{1}{2}$  li. b. narrowed and decurrent at the base, the apex terminating in a small lobe, clear green naked, membranous pellucid, cut deeply throughout into blunt or pointed ovate oblong attenuate segments which are fully adnate and decurrent at the base curved from the point on the underside with a small lobe or crenature within on the upper,  $1\frac{1}{2}$ – $\frac{3}{4}$  li. deep, less, b. *Veins* simple in the barren but with a short spur in the fertile segments, not reaching the edge, blackish. *Sori* solitary terminal on the anterior branch near the base of both lobe and segments. *Rachis* stiff, but filiform black very flexuose.

Jamaica; abundant on the highest ridges and peaks, to which it is confined, clothing in large masses on the trunks of trees, a very pretty distinct little plant, with a thread-like flexuose rachis, the hollows in the sinuosities of which form the open sinuses between the lobes, the barren segments have no crenatures and the veins is simple and falls usually much short of the margin. Though decurrent, the segments are not confluent, so that the fronds are fully pinnate. Heward's plant of this name is a small state of *P. Serpens*, Swartz, which is common in the district of Manchester parish where he collected.

13. *P. trichomanoides*, SWARTZ.—*Rootstock* erect, 1–2 li. thick, densely coated with bright pale scales; *Stipites* tufted very short furnished with a few spreading hairs, *Fronde* linear, 3–6 in. l.,  $2-3\frac{1}{2}$  li. w., light green sparingly villose with long soft dark brown or reddish hairs, firm, stiffish tapering usually to both ends; cut down almost to the filiform immersed rachis into spreading blunt oblong segments, which are  $1-1\frac{1}{2}$  li. l., and  $\frac{1}{2}$ – $\frac{3}{4}$  li. w., decurrent at the base with an oblique rounded or acute sinus, and a space their own width or less, between them; the upper side in the soriferous fronds expanded near the base into a distinct crenature or lobule dwindling to mere teeth almost or quite to the base of the stipites. *Veins* obscure, one to each segment not reaching the edge forked or producing a spur in the basal lobule which bears the sori.

Jamaica; common from 2,500 ft. to the highest altitudes, growing chiefly on trees. The habit is erect and strict in short plants but spreading in the taller ones. The segments are half as long again as wide, oblong in some cases, in others almost quarter oval, and open between. From the species near it, the lobule on the upper side of the segments uniformly and clearly distinguishes it.—West Indies and Guiana.

14. *P. basi-attenuatum*, JENM., n. sp.—*Stipites* tufted from a small erect scaly and fibrous rootstock short, if any clear of the attenuated decurrent wings of the fronds, slender and freely villose. *Fronde*s spreading or sub-pendent, soft, pale coloured, and clothed with copious long, soft, spreading silky brown reddish hair, 3–6 in. l., 2–4 li. w., the apex blunt, cut almost to the slender immersed rachis into oblong entire rounded oblique segments which are close in the greater part, but at the much tapering base lax or sub-distant, 1–2 li. l.,  $\frac{3}{4}$ –1 li. b., adnate decurrent and confluent at the base. *Veins* not reaching the edge, bearing the solitary sorus near the base on the short anterior branch.

Jamaica; common above 5,000 feet altitude on the branches of trees, a much softer plant than any of its allies from which it is further distinguished by its weaker habit, characteristically attenuated base of the fronds, the oblong broadly rounded unlobed segments lying obliquely side by side, so close that the base of each is not expanded; the longer softer surface hairs which glisten in sunlight with a beautiful reddish fulvous hue, and the usually larger sori, hitherto ascribed to the mainland, *P. truncicola* Klotzsch, a stiffer erect species with deltoid segments, set horizontally like the teeth of a saw, but possessing the same beautiful soft silky vestiture.

15. *P. truncicola*. KLOTZSCH.—*Rootstock* small, erect, villous, the crown clothed with small light brown ciliate-edged scales. *Stipites* tufted erect  $\frac{1}{4}$  in. l. less or more, slender dark brown villous. *Fronde*s stiffly erect, light green, clothed with soft fulvous brown spreading hairs. 5–8 in. l., 2–3 li. w. tapering gradually both up and down to a fine point cut nearly to the immersed slender but stiff rachis into close horizontal unlobed segments which are rounded about 1 li. w. rather more deep, the base equally broad on both sides. *Veins* simple falling short in the pagina. *Sori* single, round, of medium size situated at the base of the segment.

Guiana; Mt. Roraima, in Thurn, No. 348 and 178 (but the latter number in the Kew set is *P. trichomanoides*. Sw.) This is well distinguished by its densely villose rootstock and roots, linear fronds that gradually taper to a fine point both ways, quite horizontal segments which are hardly less contiguous at the base than above it, and simple veins. In the barren segments the veins are straight, but in the fertile curved from the thickened point which bears the sori. Venezuela, Nicaragua, Guatemala, and Columbian Andes.

16. *P. tanifolium*, JENM.—*Rootstock* fibrous, erect, *Stipites* tufted, several  $\frac{1}{4}$ – $\frac{1}{2}$  in. l., pilose with spreading dark brown hairs. *Fronde*s firm in substance, pellucid, dark green, linear 4–7 in. l., 2–3 li. w., gradually reduced at the base, pinnatifid to the slender black thread-like rachis, surfaces specially the margins clothed with spreading dark brown hairs; *Segments* oblong, rounded  $\frac{1}{2}$ – $\frac{3}{4}$  li., l.  $\frac{1}{2}$  li. w., close horizontal and connected by the adnate bases, even margined and quite or nearly equilateral. *Veins* pellucidly clavate, not incurrent and with a short fertile spur at the base, which bears the round solitary sori, forming a line on each side of the rachis, the sporangia mixed with dark-brown hairs.

Jamaica; this is intermediate between *trichomanoides* and *virgescens*. It is a stiffer plant than the former, darker in colour, though the substance is pellucid shewing the veins clearly. The segments are close, quite horizontal, rounded and not dilated or lobed on the upper margin. There are from 70 to 100 on each side. On the upper surface there is a dark spot over the end of both the main vein and the soriferous spur. The sori are dark and is also the spreading vestiture of hairs. Found by Syme at or near Mt. Moses, St. Andrew, 2,000–3,000 ft. alt.

17. *P. nutatum*, JENMAN.—*Rootstock* very small and short clothed with rather squarose reticulated scales. *Stipites* tufted filiform erect dark, slightly ciliate or naked  $\frac{1}{2}$ – $\frac{3}{4}$  in. l. *Fronde*s erect, linear tapering both to apex and base, 3–5 in. l.,  $1\frac{1}{2}$ –2 li. w., naked, or the margins and rachis beneath slightly ciliate dark or brownish green, paler beneath, pinnatifid almost to the stiffish filiform immersed rachis. *Segments* obliquely deltoid-oblong close but shortly decurrent  $\frac{3}{4}$ –1 l. l. less w. blunt. *Veins* simple in the lobes, not reaching the point. *Sori* solitary oblong or rather elongate depressed, receptacles sunk, causing a superficial edge on the upper surface.—*Journ. Bot. Vol. XXIV, p. 272.*

Jamaica; rare in forests on trees at 6,000 feet altitude. A very slender species marked by its simple veins obliquely oblong deltoid, rather decurrent segments, immersed grammitoid sori and narrow tapering character of the fronds. It is a narrower species than the next, both being very close allies, of late years they have both been gathered on other of the West India Islands.—Collected by Hart.

18. *P. Hartii*, JENM.—*Rootstock* very short and small, clothed with dark brown reticulated scales; *Stipites* tufted few slender from hardly any clear, to 4 li. l. *Fronde*s erect, linear tapering both to the apex and base, stiff and subcoriaceous, slightly ciliate on the margins or naked dark green, paler beneath 3–5 in. l. 2–3 li. w. cut almost to the membranous covered dark filiform rachis, into close round-ended oblong obliquely adnate segments  $\frac{1}{3}$ – $\frac{1}{2}$ –li. w. 1– $1\frac{1}{2}$ –li. l. the reduced basal ones deltoid; a simple vein in each not reaching the apex, bearing elongated solitary sori sunk in a cavity which forms a ridge on the upperside of the segments the sides of which are reflexed but do not cover them.—*Jour. Bot., vol. 24, p. 272.*

Jamaica; rare in forests at 6,000 feet altitude on trees. The fronds are stiff and erect though very slender very much tapered at the top, the segments very numerous, oblong or rather linear-oblong and of equal width from the very little decurrent base to the rounded end. The veins are quite simple, and the sori decurrent along them in the central part equally short of both apex and base, sunk in a cavity that form a keel on the upper side the margin reflexed and convergent.

19. *P. Sendallianum*, JENM.—*Rootstock* 1–4 li. l.,  $\frac{1}{2}$ – $\frac{3}{4}$  li., thick, fibrous, the crown clothed with very minute reticulated scales. *Stipites* freely tufted, filiform dark brown or black 2–3 li. l., slightly ciliate or naked. *Fronde*s 1–2 in. l., 1– $1\frac{1}{2}$  li. w., thin and pellucid, olive green, setiferous on the edges cut into lax oblique quite rounded much decurrent lobes which are  $\frac{1}{2}$  li. wide each way nearly to the dark hair like rachis which is raised and concealed under the parenchyma above, but more or less exposed beneath. *Veins* simple in the lobes, falling short of the margin with a clavate end. *Sori* solitary terminal on the veins.

Guiana; rare on rocks and trees in moss, &c., in the forest by Amutu Falls, Potaro River, one of the smaller species with much of the habit of *Sherringii*, but more delicate, with laxer more decurrent open lobes.—Endemic.

This was left by Jenman in MSS. as (*P. sp. Roraima*). I have ventured to attach a substantive name after one of the Governors of British Guiana. The description is that of Jenman.—(ED.)

20. *P. moniliforme*, LAG.—*Rootstock* free creeping, forming broad interlaced patches, thick as strong cord, densely coated with rather loose reticulated dark scales; *Stipites* close or scattered, numerous wiry, naked slightly scabrous, dark brown scarious margined above  $1\frac{1}{2}$ –2 in. l. *Fronde*s 3–6 in. l.,  $2\frac{1}{2}$ – $3\frac{1}{2}$  li. w., subcoriaceous naked glossy, the upper side dark green, the under pale or glaucous; the apex entire the lower part slightly narrowed, cut throughout to the slender black rachis into wide shallow alternate rounded lobes, which are close and fully adnate at the base, 2 li. w., and  $1-1\frac{1}{2}$  li. d. *Veins* 2–4 simple, hardly reaching the margins; *Sori* 2–4 to each segment, dorsal on the veins. *P. subcrenatum*, Hook., Icon., Fil., t. 719, Gr. Fl., B.W.I., p. 700. *P. flabelliforme*, Swartz, *Jamesonia adnata*, Kze.

Jamaica; abundant on branches of trees on Blue Mountains and all the peaks above 6,000 ft. altitude. Well marked by the very free creeping rootstock which interlaces so much that the scattered fronds form a well furnished mass and the broad shallow segments wider than deep, nearly half round in shape and that forms a zigzag line from one side to the other of the frond, intersected by the slightly flexuose wiry rachis. The absence of vestiture and the dorsal situation of the sori are also characteristic features.—Cuba and Mexico to Peru.

21. *P. saxicolum*, BAKER.—*Stipites* few, tufted from a black shortly elongated, slender rootstock erect wiry,  $\frac{1}{2}$ –1 in. l., dark puberulous and clothed sparsely with short spreading hairs, narrowly margined above. *Fronde*s erect,  $2\frac{1}{2}$ – $3\frac{1}{2}$  in. l., 3–5 li. br., sub-coriaceous and stiff dark green on the upper side pale beneath; ciliate chiefly on the thin sub-reflexed margins and the rachis gradually narrowed both ways, pinnatifid virtually to the black thread-like rachis. *Segments* alternate, entire horizontal oblong, on the lower and upper ones sub-deltoid, rounded the base broad and fully adnate barely confluent,  $1\frac{1}{2}$ – $2\frac{1}{2}$  li. l.,  $1-1\frac{1}{2}$  li. b. *Veins* obscure simple short 2–4 to a segment reaching hardly more than half way to the edge. *Sori* terminal also 2–4 densely bristling with stiff dark-brown hairs that are mixed with the sporangia.—Journ. Bot. 1877, 264.

Jamaica; frequent in the moister parts of the forests on the slopes of the ridges and peaks at 6,000–7,000 feet altitude, generally growing on rocks, scattered on beds of moss a plant here and there, less frequent on the branches of trees. When growing the fronds have a bluish tinge on the upper side, mostly it is found with one or two perfect fronds and two or three broken ones. Its nearest affinity is with *moniliforme*, but in this the pinnæ are deeper than broad. The densely sitiferous condition of the sori is a good distinguishing character. The roots spread horizontally through the mossy surroundings and throw up young plants from them.

22. *P. albopunctatum*, BAKER.—*Stipites* tufted from a slender shortly elongated black rootstock  $\frac{1}{4}$ – $\frac{1}{2}$  in. l. filiform, dark ciliate. *Fronde*s ligulate, 2–5 in. l.,  $\frac{1}{4}$ – $\frac{1}{2}$  in. b., membranous, pellucid, thinly ciliate chiefly beneath and on the rachis and margins pallid green, reduced at the base; cut to the filiform black flexuose rachis into close horizontal oblong or rarely roundish segments which are  $1\frac{1}{2}$ –3 li. l., 1 to  $1\frac{1}{2}$  li. b., adnate decurrent at the base often slightly restricted on the upper side and rounded at the point. *Margins* even or serrulate repand. *Veins* simple, much short of the margin often only spur-like with the dark brown sori terminal upon them, 1–3 to a

TRIBE X.—ASPIDIÆ.

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*Sori* elliptical circular or sub-reniform, rarely much larger than a pin's head usually smaller receptacles, dorsal, punctiform, elongated, or terminal on the veins. *Sporangia* compressed, stipitate, arched by an incomplete pointed vertical ring, splitting transversely when mature. *Involucres* orbicular, shield-like and attached by the centre of the disk, or sub-reniform and attached eccentrically in the sinus of the auricles, or elliptical-oblong, and attached through the centre; the edges in all cases free, tumid or flat naked or ciliate, persistent and shrivelling with age or deciduous at maturity, sometimes rudimentary; *Venation* variable, pinnate, and free, or with opposite branches uniting; or copiously reticulated with free included veinlets, growth cutting and size very variable. Six *genera* of very unequal size represent this tribe in this flora. Grisebach in the flora of the British West Indian Islands, following Mettenius includes all but one in the genus *Aspidium*. The different generic divisions here adopted are based on the form of the sori, and involucres, in conjunction partly, with venation and habit. In *Didymochloena* they are elliptical or oblong, in *Aspidium* proper, they are generally completely circular, in the three following they are orbicular reniform, of which *Nephrodium* embraces the great majority of species, while in the last (a monotypic genus) the sori are much larger, and doubled like a horse shoe, with a very deep sinus, the majority of the hardy and coarse obtrusive ferns belong to this tribe, though so many are equally seclusive and retreat loving. The distribution is universal in tropical and temperate regions, entering both the Arctic and Antarctic zones.

Sori terminal on the veins elliptical or oblong, involucre cordate at the base.

24. *Didymochloena*.

Sori circular, involucre pellate-orbicular, free round the entire edge.

25. *Aspidium*.

Sori circular or punctiform, involucres cordate-orbicular attached by the sinus.

26. *Nephrodium*.

Sori and involucres reniform, the latter attached by the sinus, terminal on the veins.

27. *Nephrolepis*.

Sori and involucres reniform, the latter attached by the sinus placed oblique with the vein, near the base or distant from the margin.

28. *Oleandra*.

Sori and involucres large folded with a deep sinus the shape of a horse shoe.

29. *Fadyenia*.

## GENUS XXIV.—DIDYMOCHLÆNA.—DESV.

*Sori* elliptical-oblong, *Involucres* attached down the centre, free round the sides except at the cordate base. *Receptacles* linear, at the end of shortened veins, which terminate within the margin to the edge of which the other veins between the sori run. *Fronde*s pinnate or bi-pinnate. Veins free.

The sori of this differs from that of the allied genera by being elongated rather than round. One or two species comprise the genus, one of which, that here represented, is spread widely over the equatorial belt in Africa extending as far as Natal.

1. *D. lunulata*, DESV.—*Rootstock*, short, erect, the crown clothed with matted fibrose tomentum. *Stipites* tufted, erect, clothed like the rootstock strong 1–2 ft. l. deeply channelled. *Fronde*s erect, bi-pinnate 2–3 ft. l.  $1\frac{1}{4}$ – $1\frac{1}{2}$  ft. w. truncate at the base. *Rachis* channelled, stiff, more sparsely clothed with tomentum than the stipe. *Pinnæ* numerous, spreading nearly at right angles, more or less apart, or the lower ones distant, 8–12 in. l.  $1\frac{1}{4}$ – $1\frac{1}{2}$  in. w. truncate at the base and very shortly stipitate, reduced to a small terminal segment at the point, terminal pinnæ similar to the lateral. *Pinnule* numerous sub-dimidiolate and rhomboidal  $\frac{3}{4}$  in. l.  $\frac{1}{4}$ – $\frac{1}{3}$  in. w. the end rounded, the inner edge parallel with the costa, occasionally somewhat auricled on the upper side. naked chartaceous, dark green. Veins sub-flabellate the ends clavate, no distinct ribs. *Sori* a line l.  $\frac{1}{2}$ – $\frac{3}{4}$  li. w. apart, forming a lax row, a little way within the plain or slightly crenulate margin, along the upper and outer sides. *Involucres* persistent folding at maturity. Hooker and Baker Syn. Fil. p. 248. Hook. Gard. Fer. t. 17, Gr. Fl. B.W.I. p. 687.

Trinidad, Cruger.—A large well distinguished plant, that is very widely dispersed, but is not common in the West Indies. Trinidad is the only one of the English Islands in which it has yet been recorded, though it has also been gathered in Cuba, and St. Domingo though its dispersal is so wide, it presents but little variation nevertheless it has been given several names. Tropical America, generally Africa and Asia.

## GENUS XXV.—ASPIDIUM,—SWARTZ.

*Sori* orbicular, rarely orbicular-reniform. *Receptacles*, dorsal, medial, or terminal on the veins. *Involucres* superior the same shape, centrally or excentrically attached, deciduous or persistent at maturity. *Venation* free, branches amastomosing or copiously areolated. *Fronde*s widely variable in form, texture, and size.

This genus forms the smaller of the two principal generic divisions of the tribe. It numbers probably between seventy and eighty species which range round the world in the tropical and temperate zones, two or three extending to the Arctic and Antarctic regions. The majority are of hard accommodating constitution, and frequent open and shaded situations with equal success and freedom. In the greatly predominating and typical form of the sori, the involucres are quite free around the circular edges, and are eventually shrivelled up in the centre of the sorus or are quite dislodged by the matured sporangia in which latter case the plants resemble and might be taken, as they often have been for true Polypodia. In some species however there is a manifest tendency in the form of the sori and involucres to the reniform condition which characterises true Nephrodia.

the base, the apex fully pinnate to the narrow serrate point, membrano-herbaceous, pellucid, dull, dark-green naked. *Pinnæ* spreading horizontally, or the lower ones deflexed and curved, approximate or sub-distant numerous, 6-10 in. l.  $2\frac{1}{2}$ - $3\frac{1}{4}$  in. w. oblong-lanceolate, the acuminate apex pinnate to the serrate point, nearly sessile. *Pinnulæ* very numerous, contiguous, and often rather overlapping, 1-2 in. l.,  $\frac{1}{4}$ - $\frac{3}{4}$  in. w., the interior pair usually a little reduced pinnate to the bluntish point. *Ultimate* segments oblong blunt, crenate, dentate, or in the largest frond lobate,  $1\frac{1}{2}$ -3 li. l.  $1$ - $1\frac{1}{2}$  li. w. contiguous, quite free at the base the lowest pair overlapping the costæ. *Rachis* costæ and costulæ, dark-coloured, scurfy-puberulous down the channel, narrowly winged with green lucent membrane. *Veins* pinnate the branches short, 3-5 to a side, simple or forked. *Sori* on the exterior branch  $\frac{1}{2}$ - $\frac{1}{4}$  li. l. reaching from the under vein nearly to the margin, the inferior double. *Involucres* tumid, pale, or brown.—Hooker and Baker, Syn. Fil. p. 242.

Jamaica, frequent in moist dells and ravines of the highest ridges from 6,000-7,000 ft. altitude. It is sometimes viviparous in the axils of the pinnæ and pinnulæ. Small fronds are only tripinnate while the largest are almost or quite fully quadri-pinnate. The narrow channel of the rachis and costæ is almost concealed by the inflexed membranous margins, which line them. It is a more finely cut species than the next and of darker colour but they have a close general resemblance.—Endemic.

68. *A. bruneo-viride*, JENMAN.—*Rootstock*, stout erect, the crown clothed with dark scales. *Stipites* caespitose, strong erect, brown, clothed at the base like the rootstock 2-3 ft. l. *Fronde*s ample erecto-spreading, 3-4 ft. l. 2-3 ft. w. quadri-pinnatifid. *Pinnæ* alternate or the lowest sub-opposite oblong-lanceolate acuminate,  $1\frac{1}{4}$ - $1\frac{3}{4}$  ft. l. 6-9 in. w. shortly petiolate spreading, the lower ones deeper on the lower side. *Pinnulæ* numerous, contiguous, alternate, not sessile, about the same shape as the pinnæ, the acuminate point serrate  $\frac{3}{4}$ -5 in. l.,  $1\frac{1}{4}$ - $1\frac{1}{2}$  in. w. *Tertiary segments* oblong, rounded, at the point, free and nearly sessile at the base, contiguous but not touching  $\frac{3}{4}$ -1 in. l. 2-5 li. w. lobed or deeply pinnatifid lobes oblong, entire rounded at the end,  $1\frac{1}{2}$ - $2\frac{1}{2}$  li. l. and about half as wide, the sinus between, narrow. *Rachis* and costæ wood brown or darker, freely channelled, costæ and costulæ margined with green membranous wings and fibrillose with small brown scales. *Veins* pinnate branches simple, 2-3 to a side. *Sori* copious  $\frac{1}{4}$ - $\frac{1}{2}$  li. l. the lowest anterior one on each lobe double. *Involucres* ample, tumid, pale brown.—Journal Botany.

Jamaica.—Infrequent in moist forests at 5,000-6,000 ft. altitude; gathered near Bellevue Peak, above the Government Cinchona Plantation. This is an exceptionally fine species, closely resembling *Wilsoni* in cutting, but much larger, and of a much paler green colour. The vascular parts are margined with membranes throughout, except the stipites, and main part of the rachis; fibrillose, and somewhat furfuracious in the grooves and under the base of the costæ. It is very near too to *A. sandwichianum* MET. from the Sandwich Islands and Peru, but larger. The specimens at Kew are a beautiful light brown-green and clearly indicate that the colour is pale, but specimens since gathered by Sherring are as dark as *Wilsoni* but this is probably due to slow drying.—Endemic.

69. *A. marginatum*, LINN.—*Rootstock*, very stout, erect scaly. *Stipites* erect, 2-3 ft. l. stout, clothed at the base like the rootstock, glabrous upwards. *Fronde*s erect, 4-6 ft. l. 2-3 ft. w. simply pinnate

throughout with a terminal pinnae like the lateral; membrano-chartaceous, pellucid, bright vivid green; glabrous throughout. *Pinnae* spreading oblong acuminate sessile and cordate at the base 1-1½ ft. l. 3-4 in. w. forming numerous opposite distant pairs, reband scarioso edged and crenulato-crispate the apex rather caespitose. *Rachis* strong overlapped by the rounded auricles of the base of the pinnae, costae raised and prominent beneath, brown or stramineous. *Veins* running in close parallel lines  $\frac{2}{3}$  from the costae to the margins, these freely anastomosing and forming a fine net work of elongated areolae with an exterior transverse sub-marginal vein. *Sori* linear, in contiguous parallel lines, extending from the mid-rib the length of the simple interior portion of the veins. *Involucres* very narrow membranous.—Hook. Fil. Exot. t. 63. Hooker and Baker Syn. Fil. p. 246. Gr. Fl. R.W.I. p. 680. *Hemidietyum*, PRESL.

Jamaica, St. Vincent, Trinidad.—Infrequent in moist districts near streams in forests among the lower mountains at 1,000-2,000 ft. altitude. Gathered in Jamaica at Chesterfield, St. Mary. This is a very majestic plant, the largest of the *Asplenias*, and hardly inferior in its stately proportions to the larger species of *Hemitelia*. The auricles of the base are so deep that they overlap from opposite pinnae casually the inferior one shows a disposition to form a lobe, with a central vein, and forked branches. The texture is thin and copiously pellucid-dotted, and the venation though fine shows clearly on the under side.—Cuba, Guadeloupe, Martinique, from Venezuela to Peru, and Brazil.



side; the mid-vein often also with a terminal sorus upper side sprinkled with crustaceous dots situated over the sori.—Journal Botany, 1877, p. 265.

Jamaica; frequent and plentiful on trees above 6,000 ft. altitude along the higher ridges forming large patches on the trunks of trees. The pinnæ are deciduous leaving the hair-like rachises, which are persistent, and durable; and freely interlaced on the plants. This feature and the white silvery dots on the upper surface, are good characters to recognise the species by.—Endemic.

23. *P. mazarunianum*, BAKER.—*Stipites* cæspitose, ciliate, hardly any clear of the decurrent parenchyma. *Fronde*s several or many chartaceous rather glaucous, naked or hardly so,  $1\frac{1}{2}$ – $2\frac{1}{2}$  in. l.,  $\frac{1}{4}$ – $\frac{1}{3}$  in. w., cut practically to the rachis. *Segments*  $\frac{1}{4}$  in. l., blunt, rather sinuate, wider in the middle with a sharp sinus between, decurrent at the base, the lower ones reduced to a mere wing to the stipites hardly a line w. *Rachis* black, thread-like hardly naked. *Veins* pinnate, the branches short, alternate not reaching the margin, obscure, *Sori* 2–4 on each side of the mid-vein, terminal on the veins.

Guiana; Mazaruni River, rare. A small plant found on trunks and branches of trees by the river side. In habit between *P. Trichomanoides*, *P. subtile* and *P. jubæforme* possibly only a small form of the latter.—Endemic.

24. *P. jubæforme*. KAULF.—*Rootstock* slender, short, erect, clothed with a few acuminate minute reticulated scales; *Stipites* tufted, very short or hardly any clear of the decurrent frond. *Fronde*s, 4–9 in. l.  $\frac{1}{4}$ – $\frac{1}{2}$  in. w., firm but moderately thin and pellucid; naked, light green, tapering both ways, fully pinnate. *Segments* close, 1 li. w. 2–3 li. b. entire or the fertile slightly sinuate, linear-oblong, blunt or acute-adsnate decurrent at the base, with a close oblique sinus between them. *Rachis* black, filiform nearly or quite naked; *Veins* simple evident, falling short of the edge. *Sori* terminal confined to the outer half or two-thirds of the lobes, immersed, the opposite side papillose.

Jamaica; gathered by Swartz whose specimen is in the British Museum, but collectors since in that country have not rediscovered it. Grisebach united it with *pendulum* which it somewhat resembles, but is much smaller. The narrow tapering character of the fronds, with no distinct lobe, firm but thin texture naked surfaces, sori confined to the outer part of the segments, where it becomes confluent and the skeletonised scales of the rootstock sufficiently distinguish it.—Porto Rico and Panama.

25. *P. subtile*, KUNZE.—*Rootstock* slender, erect, villose with reddish hair, as are also the very short tufted stipites. *Fronde*s pinnate 3–6 in. l.,  $\frac{1}{4}$ – $\frac{3}{4}$  in. w., erect membranous, pellucid, more or less ciliate on the edges, tapering at the base, the apex acuminate with an entire or sub-lobate point; rachis filiform, raised on both sides, segments spreading contiguous, oblong, blunt, slightly repand, fully adsnate, shortly decurrent with a sharp sinus between, 3–4 li. l.,  $1\frac{1}{2}$  li. w., the apex rounded. *Veins* spur-like, with a terminal sorus to each, situated near the mid-vein, which has also a terminal sorus short of the margin, the upper side of all being covered or not by a crustaceous dot.—Hook. Sp. Fil. t. 275. (A.) *P. subscabrum* (non. Kl.) Hook. Sp. Fil. t. 274.

Guiana; a large more erect, stiffer plant than *albopunctatum* but otherwise much resembling it.—The Guianas to Peru.

26. *P. kaieteurum*, JENM.—*Stipites* tufted, from a small short-creeping rootstock,  $\frac{1}{2}$ –1 in. long black puberulous ciliate. *Fronde*s fully pinnate, 3–5 in. l.,  $\frac{1}{2}$ – $\frac{3}{4}$  w. reduced at the base but not decurrent, the apex terminating in a caudate sinuate point, coriaceous, pellucid; brown–green slightly ciliate, mostly so on the margin or quite naked, eventually. *Lobes* close or with a narrow space between them, round ended, broadly adnate at the base, 1 line wide, 3–4 lines long entire. *Rachis* filiform, flexuose black ciliate—puberulous. *Veins* pinnate, the branches simple, and short of the margin; *Sori* sunk, separate, medial or near the edge, terminal, and occupying all the veinlets, glandulose but not papillose on the upper surface.

Guiana; rare on trees in forests above the Kaieteur Fall, Jenman, n, 1423. Intermediate in general aspect, between *P. jubæforme* and *P. pendulum*, and best marked by its relatively wide fronds; rather long caudate, terminal segment, (often however broken away) the stipites not winged, by decurrent pinnae, and medial or intramarginal sori.—Endemic.

27. *P. Kegelianum*, KZE.—*Rootstock* forming a tuft, paleaceous and with the very short caespitose stipes clothed with ferruginous hairs. *Fronde*s 2 in. l. 2–4 li. w., coriaceous, pale green, somewhat pellucid, fusco-pilose especially beneath and on the sub-reflexed margins, lanceolate, the base alternate, pinnatifid. *Segments* triangular-ovate, obtuse, entire with open rounded sinuses between. *Veins* obscure. *Sori* 4–5 to a segment.—Hook, Sp. Fil. p. 189.

Guiana; Surinam, Kegel.—This I have not seen. The author says, though abundantly distinct, resembles *discolor*, but is only half the size; it seems to come near *jubæforme*.—Endemic.

28. *P. discolor*, HOOK.—*Rootstock* fibrous, erect densely clothed with stiffish small linear-acuminate costaneous scales. *Fronde*s tufted, erecto-spreading, 6–8 in. l.  $\frac{1}{2}$ – $\frac{3}{4}$  in w., pinnatifid to within a li. of the costae, ligulate. *Segments* rounded, oblong, obliquely dilated at the base,  $1\frac{1}{2}$ –2 li. b.  $\frac{1}{4}$ – $\frac{1}{3}$  in l., reduced at the bottom of the frond to deltoid shallow lobes, there being no distinct stipites, sinuses oblique, hardly rounded but more or less open, margin entire and even. *Veins* forked and with midrib and rachis quite immersed in the pagina. *Sori* round, 3–5 to a side, nearer the edge than midrib.—Hooker and Baker, Syn. Fil. p. 325. Hook–Icon. t. 4., Fl. Brazil, p. 509.

Guiana; gathered by Schomburgh—but no locality given. Very stiff and coriaceous something like the smallest states of *P. inaequale*. The upper, as well as the under side is powdery at first but much less so, and this powder makes the substance appear opaque, which however, when devoided of it, it is not.—Endemic.

29. *P. rigescens*, BORY.—*Rootstock* elongated, short creeping or sub-erect, the scales linear-acuminate, dark, reticulated. *Stipites* tufted or apart stiff blackish, 1– $1\frac{1}{2}$  in. l., hispid, pilose, with black spreading hairs. *Fronde*s 6–10 in. l.,  $\frac{1}{2}$ – $\frac{3}{4}$  in. w., linear lanceolate, rigid erect, but usually curved, a dark brownish black-green above, paler beneath, tapering equally to apex and base, terminating above with a caudate entire point; coriaceous and opaque naked except among the capsules and on the rigid black rachis. which is clothed like the stipites, but least in degree or

at length naked above; cut almost or quite to the rachis into close oblong rounded segments which are  $\frac{1}{4}$ - $\frac{1}{2}$  in. l. and  $1-1\frac{1}{2}$  l. w., straight entire, the base obliquely or sub-equally adnate, and little dilated, lower ones dwindling to less than a line deep, but not separated and more rounded than deltoid. *Veins* obscure, simple, reaching the margin. *Sori* dorsal, medial, 4-6 to a side reaching from the bottom to the top of the segments, the lower third of the frond barren. Hook. and Grev. Icon. Fil. t. 216.

Jamaica; frequent on the branches of trees above 5,000 feet altitude. This is among the most rigid of all these species. In Jamaica it uniformly grows on the branches of trees, on the high ridges to which they are confined, not on the trunks as most of the other smaller species. Like some other species they stain the mounting paper a deep green leaving a distinct impression permanent. When dry the margins are reflexed and there are casually a few scattered hairs on the mid-ribs. Eventually the segments are deciduous, leaving the stiff slender rachis.

(*Polypodium rigens*, Maxon Jamaica Bull., 1904). See appendix.

30. *P. tovarense*, KLOTZCH.—*Rootstock* small fibrous, upright, the crown clothed with small brown scales. *Stipites* densely tufted short. *Fronde*s firm in substance but pellucid, naked, pale green, linear-ligulate, pendent,  $\frac{1}{2}$ - $1\frac{1}{4}$  ft. l.,  $\frac{1}{3}$ - $\frac{1}{2}$  in. w., a little reduced at the base, deeply pinnatifid. *Segments* spreading horizontally, sub-dimidiatae ovate apart or sub-distant, and much decurrent on the inferior base, forming narrow wings to the rachis, the upper side expanded into a distinct auricle and free, margins rather sinuate, repand or crenato-lobate on the upper side. *Rachis* and *Veins* immersed in the pagina, the latter simple, very short, falling half way short of the margin only 2-3 to a side with terminal round sori which are slightly impressed. Hooker and Baker, Syn. Fil., p. 324. Fl. Brazil, p. 508, *P. phlegmaria*, J. Sm., *P. subdimidiatum*, Baker.

Guiana; Roraima, Schomburgh, n. 161. *Appun*. n. 1130. A delicate pendent plant growing on the trunks and branches of trees very thin and pellucid in texture and of a yellowish or straw green colour, the slender black hair-like rachis waving in its course is sometimes revealed on the upper side but though quite covered by the parenchyma is prominent beneath. In the shape of the lobes it approaches nearest to *P. cultratum*. They are often or mostly crenate-lobate, owing to the shortness of the veins, the 2-4 sori of each segment when ripe, are crowded and form a single mass in the centre.—Venezuela, Fendler, n. 207, Ecuador; Jameson, n. 2122.

31. *P. heterotrichum*, BAKER.—*Rootstock* small fibrous. *Stipites* tufted, very numerous, less than an inch l., slender, wiry, clothed with long soft spreading hairs; *Fronde*s pendant and over lapping, flaccid, dull gray or rusty-green—3-8 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. b. ligulate, or oblong-ligulate, little reduced at the base, quite pinnate. *Segments* numerous, close, spreading, obliquely adnate or decurrent at the base, linear oblong, blunt or pointed, 1 li. w.,  $\frac{1}{4}$ - $\frac{1}{2}$  in. l., entire or rarely serrulato-dentate, the upper margin often with a slight curve. *Rachis* filiform, black and with both surfaces puberulous-glandulose, and rusty-ciliate with soft spreading hairs. *Veins* short, simple, oblique, reaching half-way or more to the margin. *Sori* copious, dorsal or terminal, close in two contiguous rows near the mid-rib 4-7 to a side.—*Jour. Botany*, Vol. 8, new series, p. 262.

Jamaica ; frequent on trees in forest about the highest peaks at 7,000 ft. altitude gathered on Blue Mountain and John Crow peaks, intermediate between *cultratum* and *capillare*. From the latter its hairy surface at sight distinguishes it, and from the former the smaller size, close narrow-pointed segments which are fully adnate though sometimes a little narrowed, and not rounded or auricled at the base on the upper side, and the copious close brown sori. In the mature fronds the pinnæ of the lower half or third are usually dead and dry.—Endemic.

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32. *P. pendulum*, SWARTZ.—*Rootstock* small or shortly repent and elongated clothed with reticulated copiously ciliate scales. *Stipites* tufted, very short if any clear of the decurrent wing, black and grey with stellate puberulæ. *Fronde*s pendent sub-coriaceous, copiously pellucid dotted glabrous, bright, pale, brown-green glossy,  $\frac{1}{2}$ –1 ft. l.,  $\frac{1}{2}$ –1 in. w., tapering to the attenuated base and less so to the short entire pointed apex, pinnatifid nearly to the rachis. Segments spreading entire  $\frac{1}{4}$ – $\frac{1}{2}$  in. l.,  $1\frac{1}{2}$ –2 li. b., obtuse-acute pointed dilated and broadly adnate and confluent at the base, with an open rounded sinus between that is once or twice their own width, the reduced lower ones triangular. *Rachis* filiform black beneath, above covered by the pagina, rather flexuose. *Veins* and ribs raised on the upperside, the former short, not reaching the margin, the apices thickened and glandulose above. *Sori* 2–6 to a side close to the mid-vein on a very short basal spur, sunk, the opposite surface papillose just within the glands of the veinlets.

Jamaica ; infrequent on trunks of trees in forests at 6,000 feet altitude. In the larger states, which sometimes reach  $1\frac{1}{2}$  ft. l., the segments are dilated, nearly though not quite equally at the base on both sides, and are therefore only hardly more decurrent than surcurrent. The species is well marked by the freely ciliate light coloured scales of the rootstock, papillose, glandular surface, and sori lateral near the base of the veins. It varies in colour from dark to rather yellowish green, and is always clear and bright. Some creature seems to feed on the fronds for out of possibly a hundred, gathered over a series of years, only one is entire.

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33. *P. grenadense*, JENM.—*Rootstock* very shortly repent, slender, clothed with minute ciliate-edged reticulated brown scales ; stipites tufted, wiry, finely ciliate,  $\frac{1}{2}$  to 1 in. l., fronds pinnate, several, light green, chartaceous pellucid, naked 4 to 6 in. l.,  $1\frac{1}{4}$  in. w., more or less, reduced at the base and apex, the latter terminating in a linear segment, 1 to  $1\frac{1}{2}$  in. l., pinnæ spreading obliquely, close, with a sharply acute sinus, numerous, fully adnate, obtuse,  $\frac{1}{2}$  to  $\frac{3}{4}$  in. l.,  $1\frac{1}{2}$  to 2 l. w., crenated ; *Rachis* dark, ciliate, not covered either side by parenchyma ; mid-veins rather flexuose, branches simple not reaching the margin with terminal papillose sori.

Grenada, West Indies, gathered by Sherring and referred by Mr. Baker to *P. pendulum*, Swartz. The Swartzian name was based on a Jamaica species from which this is particularly distinct.—Gard. Chron. Feb. 3rd, 1894.

34. *P. subsessile*, BAKER.—*Stipites* densely tufted from a shortly elongated erect ciliate-scaly rootstock. *Stipites* very short if any clear. *Fronde*s pendent, glabrous, straw green, subcoriaceous and stiffish  $\frac{1}{2}$ – $1\frac{1}{2}$  ft. l.,  $1$ – $2\frac{1}{2}$  in. w., very deeply pinnatifid with a distinct terminal segment. *Segments* linear  $\frac{1}{2}$ – $1\frac{1}{2}$  in. l.,  $1$ – $1\frac{1}{2}$  in. w.,  $\frac{1}{4}$ – $\frac{1}{2}$  in. or more apart, much dilated on both sides at the very base and slightly connected, forming a rounded or flattish widely open sinus; margins sub-crenulate. *Rachis* thread-like, dark and exposed beneath, covered on the upper side by the pagina, mid-veins and branches also immersed, the latter short, oblique, simple, spurlike sub-distant. *Sori* obliquely impressed round medial, terminal on the veins.—Hooker and Baker, Syn. Fil. p. 329. *P. pteropus* Hook, Sp. Fil. t. 275. B.

Guiana, Roraima, Schomburgh. Appun. n. 1039, im Thurn, n. 378. Distinguished from *pendulum* which it approaches closely, by the longer sub-crenate relatively narrower segments, which are two or three times as wide apart. *Sori* on the simple vein and much longer winged base of the frond. The sori often originates just within the point of the vein which however they cover and thus appear quite terminal as they expand.—Columbia and Ecuador.

35. *P. lasiolepis*, METT.—*Rootstock* shortly repent, 2–3 l. thick, densely clothed with dark brown reticulated and ciliate scales. *Stipites* sub-tufted ciliate with spreading hairs, strong dark coloured, from hardly any to 1 in. l. *Fronde*s 6–9 in. l.,  $\frac{3}{4}$ – $\frac{7}{8}$  in. w., firm especially on the rachis and margins dark or light clear brown-green, pinnatifid nearly to the rachis, passing at the apex rather abruptly into a sub-entire point, gradually reduced at the base through rather deltoid to rounded broad and shallow scalloped-shaped lobes, which are connected and form a wing to the stipites. *Segments* oblong obtuse pointed broadened to the base where they are close, obliquely adnate and connected 4–6 li. l.,  $1\frac{1}{2}$ –2 li. b. *Rachis* thread-like, but rather strong, a little flexuose or not. *Veins* simple reaching half way to the margin with the sori terminal upon them.

Jamaica; infrequent at 4,000–5,000 ft. altitude on trees in forests gathered at Vinegar Hill and elsewhere. This comes nearest perhaps to *pendulum* from which it differs by the stronger rootstock, close, more decurrently adnate segments hairy surface, terminal superficial sori, absence of glands and different apex and base. It is also erect in growth and the veins and midribs of the pinnae are not round on the upper side.—Guadeloupe.

36. *P. cultratum*, WILLD.—*Stipites* numerous, tufted, slender,  $\frac{1}{2}$ –1 in. l. or rather more, clothed with long soft reddish or rusty silky hairs as is also the small fibrous rootstock. *Fronde*s pendent, flaccid  $\frac{1}{2}$ –1 ft. l.  $\frac{1}{2}$ – $1\frac{1}{2}$  in. w. rusty with copious soft spreading hairs, membranous pellucid, tully pinnate, shortly reduced at both base and apex. *Pinnæ* very numerous horizontal close or somewhat apart lanceolate-oblong  $\frac{1}{2}$ – $\frac{3}{4}$  in. l.,  $1\frac{1}{2}$ –2 li. w., the end rounded, both the upper and under sides of the fully adnate base slightly decurved. Margins entire, rachis black filiform, villous. *Veins* simple short reaching about half way to the margins 6–8 to a side with the rounded sori, which are not very close, terminal on their ends, forming a medial series, mid veins flexuose, often or usually fertile at their extremity, sporangia copiously mixed with rusty hairs.—Pl. Fil. t. 88 (much too large.)

(A.) var. *elasticum*,—*Fronde*s linear ligulate nearly or quite sessile, shortly or at considerable length, reduced at the base, often little, if at all so at the top, uniform or variable in width throughout  $\frac{1}{3}$ – $1\frac{1}{2}$  ft. l.  $\frac{1}{4}$ –1 in. w., segments close, fully adnate at the base 2–6 li. l. 1–2 in. w. the upper margin curved, or decurved even. *Veins* 2–6 to a side, texture delicately thin, sori usually 3–6 on the outer veins.—*P. elasticum*, Bory.

(B.) var. *brachyphyllum*, Gr.—*Fronde*s 4–12 in. l.,  $\frac{3}{4}$  to over 1 in. w., segments oblong, ovate or lanceolate-oblong, varying from close to nearly their own width apart,  $\frac{1}{4}$ – $\frac{2}{3}$  in. l.  $1\frac{1}{2}$ –2 li. b., rounded or sub-auricled on the upperside of the base and more or less free there, margins even or crenate. *Veins* sori and texture as in the type.

(C.) var. *heterophyllum* lanceolate oblong, crenate or lobate, often transformed into pinnate pinnae which resemble the normal fronds.

Jamaica; abundant, draping the trunks of trees, in forests above 4,000 or 5,000 feet altitude, one of the commonest of the epiphytal species of the great forest region. Well distinguished by its soft flaccid membrano-elastic texture and soft copious vestiture of reddish or fulvous hairs. In nearly all the forms there is more or less a distinct curvature of the upper margin from the base outwards. The type is marked by the segments being fully adnate at the base. The upper side not at all auricled, or partially free. (A) is most though not uniformly a smaller delicate textured state of narrow width sometimes much attenuated at the base, with shorter segments which are often fertile only in the outer half. (B) is the commonest of all and very variable. It is best recognised by its usually more open segments which show a tendency more or less developed to form an auricle and become free of the rachis on the upper (and sometimes the under) side. They resemble in shape those of *Asplenium parvulum*. (C) is a variety of the last in which the pinnae are lobed or changed entirely into frond like branches from one to four inches long,  $\frac{1}{2}$  to  $\frac{3}{8}$  inch wide, making the fronds as broad as long.—Cuba to Brazil and Peru.

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37. *P. zanthotrichium*, KLOTZCH.—*Stipites* tufted from a small fibrous tomentose rootstock,  $\frac{1}{4}$ –1 in. l. or over, brown pubescent, or tomentose. *Fronde*s pendent 1– $2\frac{1}{2}$  ft. l.,  $1\frac{1}{2}$ –2 in. w. pinnate of pinatifid greatly reduced at the base, chartaceous flaccid, brown-green, pellucid in innumerable minute dots, rusty scurfy pubescent beneath, rachis pubescent on both sides. *Segments* close, very numerous, horizontal, broadly adnate at the slightly decurrent base, thence narrowed slowly to the rounded point, 1– $1\frac{1}{4}$  in. l., 2–3 li. w., the margin nearly even, the inferior ones reduced to minute segments that line in a narrow sinuate wing the base of the rachis. Midrib slender, flexuose. *Veins* simple, oblique, clavate, reaching only half way to the margin; *Sori* medial elliptical or oblong, becoming gradually round at the end of the segment. Sporangia stellate-ciliate.—*P. ellipticosorum*, Fée.

Guiana; upper slope of Roraima, a large plant but of similar substance habit and general aspect as *cultratum*, differing by the elliptical oblique sori, a character which however is not very marked in narrow fronds, and the rusty-gray very fine stellate ciliation of the under surface and the sporangia. On both sides of the base the segments are slightly decurved. The inferior veins are barren, the outer ones shorter to mere spurs, and the end of the mid-vein or vein-like rib is fertile within the rounded end of the segment.—Brazil.

38. *P. capillare*, DESV.—*Stipites* tufted from an erect fibrous ciliate scaly and villose root-stock winged to the base, or nearly so, by the decurrent sides of the fronds, deciduously villose, wiry and dark-coloured. *Fronde*s prostrate or pendent 3–10 in. l.,  $\frac{1}{2}$ –1 or 3 in. w., shortly reduced at the base, nearly or quite pinnate throughout chartaceous pellucid naked or slightly puberulous, glandulose pale green and rather glossy on the upper side. *Segments* close linear adnate-decurrent, the point acute,  $\frac{1}{4}$ –1 or 2 in. l., about 1 li. more or less w. with an oblique open or acute sinus between. *Margins* more or less conspicuously sinuate rarely distinctly toothed. *Rachis* black filiform. *Veins* simple (rarely forked) very oblique not reaching the margins, midveins flexuose. *Sori* terminal, separate, slightly sunk or superficial. *P. decipiens* Hook. sp. Fil. vol. 4-t. 279. B.

Jamaica; frequent on trees in the forests round the summits of the highest peaks, at 7,000 ft. alt. It varies a good deal in size. It is best distinguished from *graveolens* by the more distinctly sinuate pinnæ the margins being expanded where the sori occur, and contrasted between which in the smaller plants gives quite a crinkled aspect. It is also destitute of the strong scent of that species and occupies a higher elevation. The pinnæ sometimes are transformed into elongated pinnate frond-like branches, as in *cultratum*, 2–3 in. l.—West Indies to Peru.

39. *P. graveolens*, BAKER.—*Rootstock* densely clothed with soft small brown ciliate scales and reddish spreading tomentum, upright nearly pencil thick. *Stipites* densely tufted, wiry, clothed like the root-stock.  $\frac{1}{2}$ –2 in. l. *Fronde*s prostrate or pendent  $\frac{1}{2}$ –1 ft. l. 1–2 or 3 in. w. little or hardly reduced at the base, the apex often terminating in a long linear sinuate or lobate caudate segment: fully pinnate throughout or nearly so to thread-like rachis, chartaceous, pellucid, puberulous, often with granular dust beneath, pale green, glossy above. *Pinnæ* linear, acute or obtuse, faintly crenulate-repand, spreading or erecto-spreading 1–1 $\frac{1}{2}$  or 2 in. l. about 1 li. more or less w., equal or unequal in length adnate-decurrent at the base with an oblique rounded sinus and open space, 1–4 times their own width between. *Veins* very oblique, simple or forked, not reaching the edge. *Sori* terminal, about  $\frac{1}{8}$  in. apart alternate or sub-opposite in contiguous rows.—Journ. Bot. 1877, p. 265.

Jamaica; abundant on trees in the forest clothing the ridges at 5,000–6,000 feet altitude. Less variable in size than *capillare*, more constantly uniform in habit, the pinnæ more even in the margins and much more open between, and the rootstock more densely villose; the bright coloured scales being scented with a perfume that apparently loses none of its fragrance with lapse of time. The veins are so oblique as to run nearly parallel with the midrib.—Endemic.

40. *P. curvatum*, SWARTZ.—*Stipites* tufted from a fibrous finely scaly erect rootstock, short and entirely winged to the base. *Fronde*s pendent, 9–18, or more, in. l.,  $1\frac{1}{2}$ –4 in. w., coriaceous and brittle, glabrescent or puberulous with white granular dust, pale or dark green above, greyish beneath; reduced at the base, pinnatifid nearly to the flat completely immersed rachis. *Pinnæ* spreading, linear usually rather unequal in length, 1–2 in. l., 2–3 li. w. at the dilated obliquely adnate confluent base, with an acute or rather open sinus between; sinuate repand thin; *Veins* usually forked, both branches

a little short of the margin. *Sori* round or oval, terminal on the anterior limb about  $\frac{1}{8}$  in. apart in a long marginal row on each side. *P. inaequale*, Fée, Fil. Ant. t. 12 (A). *Fronde*  $\frac{3}{4}$  in. w. linear, uniform in width  $\frac{1}{2}$ – $1\frac{1}{2}$  ft. l., segments oblong, blunt, close, with the sori usually in the outer part.

Jamaica; common, in the forest above 5,000 ft. altitude on trees. A peculiar species showing no close affinity with any local species of a gray leathery appearance very brittle and the whole vascular ramification including stipe and rachis concealed under the parenchyma, as in some of the smaller species. (A) is found in coffee fields on decaying logs at 2,500 ft. altitude gathered at Murray's flat, Mount Moses. The fronds are uniformly linear reaching  $1\frac{1}{2}$  ft. or more long, the inner half or more being dead and brown in the longer ones. This is near *P. Pearcei*, Baker. Syn. Fil., p. 508.

41. *P. Ottites*, SWARTZ.—*Rootstock* fleshy, repent, as thick as a quill or less, densely clothed with bright reticulated scales, which are mixed with tomentum. *Stipites* erect, serial, apart, but often contiguous  $1$ – $2\frac{1}{2}$  in. l. dark, slightly ciliate or naked, faintly margined above; *Fronde* erect,  $4$ – $9$  in. l.  $\frac{3}{4}$ – $1\frac{1}{2}$  in. b. little or hardly reduced at the very base, the apex terminating in a sinuate subentire segment pinnate, elástico-membranaceous glabrescent, dark or brown-green. *Pinnæ* spreading or erecto-spreading  $\frac{1}{2}$ – $1$  in. l.  $1$ – $1\frac{1}{2}$  li. b. entire or crenate sinuate, linear-oblong obtusely pointed, adnate decurrent, to the slender dark stiffish ciliate or glabrescent rachis with a clear space once or twice their own width between or narrowly confluent by a rounded oblique more or less open sinus. *Veins* oblique simple, or rarely furcate at the apice terminating much short of the margin, mid-vein flexuose. *Sori* terminal (on the anterior branch when the vein is forked) medial nearly  $\frac{1}{8}$  in. apart.—Plum. Fil. t. 85. *P. tenuifolium*, 4 H. B. K.

Jamaica; infrequent on wet rocks in forests of Portland at about 2,000 ft. altitude, resembles *graveolens* and *capillare* somewhat in the pinnæ, but the texture is thinner and more elastical, and the rootstock quite different with few stiff straight petioles and fronds. Only the basal pair of pinnæ are usually reduced.—Cuba to Venezuela.

42. *P. trifurcatum*, LINN.—*Rootstock* short creeping,  $2$ – $3$  l. thick densely clothed with bright slightly ciliate-edged scales. *Stipites* wiry tufted  $3$ – $5$  in. l. dark, clothed thinly with spreading aureous hairs. *Fronde* linear-lanceolate densely pellucid dotted, chartaceous dark green, naked or slightly villose especially on the margins  $5$ – $10$  in. l.,  $\frac{3}{4}$ – $1\frac{1}{4}$  in. w. or over, the base shortly cuneate the apex obtuse and sub-entire obliquely lobed  $\frac{1}{3}$  or rather more to the slender flexuose covered rachis; lobes entire about  $\frac{1}{4}$  in. w. and as much or less d. close rounded. *Veins* pinnate in the lobes, the branches curved, not reaching the margin, the opposite basal ones casually uniting. *Sori* copious nearly medial on each side of the flexuose primary veins, the costal ones usually oblong and dorsal or terminal on the veinlets, those above these round and situated on a lateral spur.—Plum. Fil. t. 138. Hook and Grev. Icon. Fil. t. 42. *P. comptonifolium* Desv. *P. scolopendrioides* Hook. and Grev.

Jamaica; infrequent on trees and rocks at 2,000–3,000 feet altitude in the forests of Portland. The casually uniting veins might remove this to the other primary division and the sub-entire state that some of the fronds are found into



the first section of this, but it has obviously most relationship here; distinct and isolated though the type is from any of its allies. Confusion must be guarded against from the genus *Enterosora* which is exactly of the same size and form. Plumiers figure is a very good one but all the fronds are made trifurcate at the top.

*The above is Jenman's placing of this interesting species, but its affinity with Enterosora appears fairly evident.*—(Ed.)

43. *P. Eggersii*, BAKER.—*Rootstock*, short, rather slender, repent or erect. *Stipites* tufted or sub-tufted, wiry dark brown 1–2 in. l., erect, thinly clothed with spreading hairs. *Fronde*s 3–7 in. l.,  $\frac{2}{3}$ –1 in. w., thin and elastic, pellucid, thinly ciliate especially on the rachis and edges and bright metallic green, terminated or not by a distinct segment, somewhat reduced at the base, pinnatifid throughout almost to the black thread-like rachis, which is not immersed. *Segments* close, obliquely adnate, oblong rather rounded at the point, even margined 5–6 li. l.,  $1\frac{1}{2}$ –2 li. w., with a sharp sinus between. *Veins* few, simple or forked, sori nearer the mid-rib than margins on a short spur.—Hook., Icon., t. 1671.

Jamaica; rare on trees in forests near Mount Moses, 2,000–3,000 ft. altitude, resembling *lasiolepis* in habit and size. It has the texture of *suspensum* and *cultratum*, but rather firmer, and in form is intermediate between the former and *brunco-viride* with the rather upright growth of the latter and metallic tinge in colour. It is also near *lasiolepis*.

44. *P. suspensum*, LINN.—*Rootstock* creeping, elongated, densely coated with bright rather soft ciliated small scales—*Stipites* 4–8 in. l. subtufted or apart, erecto-curving slender, dark or blackish varying from almost naked to pilose with soft rusty spreading hairs. *Fronde*s pendent, linear lanceolate  $\frac{1}{2}$ – $1\frac{1}{2}$  ft. l.  $1\frac{1}{4}$ – $1\frac{3}{4}$  in. w. flaccid membranopapyraceous, both surfaces and specially the margins more or less clothed with soft rusty spreading hairs cut to the thread-like blackish often flexuose rusty ciliate rachis, into close horizontal segments  $\frac{1}{2}$  to nearly 1 in. l. 2– $2\frac{1}{2}$  li. w. which are oblong lanceolate and gradually narrowed outwards to an acute or blackish point, the bases broadly adnate equilateral sometimes dilated; *Veins* simple not reaching the entire margin; *Sori* dorsal or terminal on a rudimentary lateral spur produced below the middle of the vein, rows contiguous, nearer the mid-vein than margins. Pl. Fil. t. 87 (dubious).

Jamaica; common on trees above 5,000 ft. altitude in the eastern parishes and at 2,000 ft. in the woods of the western, larger in the latter. The stipites are erect but curved at the neck so that the fronds which are occasionally narrowed there, one or two pairs of the segments being reduced, hang pendent over each other, tapering by imperceptible graduations to the outer end.—West Indies and Brazil.

45. *P. asplenifolium*, LINN.—*Rootstock* short, densely clothed with ciliated brown acuminate scales. *Stipites* curved more or less tufted 6–8 in. l. wiry, dark brown, pilose-villose with spreading brown hairs. *Fronde*s elastico-chartaceous fuscous-green pubescent chiefly beneath and on the margins, pendent  $\frac{3}{4}$ – $1\frac{1}{2}$  ft. l. 2–3 in. b., the base reduced, cut to the dark exposed pilose rachis into close horizontal segments which are broadest at the sub-equilateral and fully adnate base, tapering thence to the rather bluntish point,

1-1 $\frac{3}{4}$  in. l.  $\frac{1}{4}$  in. w., even edged or faintly serrulate within. *Veins* oblique, close. *Sori* on a short anterior spur, round contiguous forming a medial row on each side the slender vein-like midrib of each segment.

Jamaica; a larger and much stronger plant than *suspensum* with close horizontal tapering pinnae which are broadly adnate and evident at the base, with two rows of rather large circular medial sori. First gathered by Swartz. My description is taken from specimens collected by Syme at Jones' Gap—which are quite identical with those from other countries in the Kew Herbarium. The segments are both shortly surcurrent and decurrent at the open base, and with an open but sharply acute sinus, as in the larger states of *suspensum* from which it is hardly distinct.

*Specimens collected by Hart in the St. Andrew's mountain district conform to this description.*—(Ed.)

46. *P. brunneo-viride*, BAKER.—*Rootstock* short, elongated, erect or decurrent, densely clothed with subulate dark-brown ciliated scales. *Stipites* tufted, 3-5 in. l., few, stiffly erect, dark, chartaceous, or blackish, glossy, nearly or quite naked. *Fronde* sub-erect, oblong lanceolate 4-9 in. l., 1-2 in. w., subcoriaceous pellucid dotted, naked, or with few inconspicuous hairs on the margins, dark green above, pale beneath and tinged metallic brown base, truncate and not reduced, very gradually narrowed upwards to the sub-entire pointed apex cut almost to the black thread-like puberulous, or slightly scurfy rachis, into close, oblong-lanceolate spreading pointed obliquely adnate confluent entire even-margined segments, which are  $\frac{1}{2}$ -1 in. l., 1-3 li. b. at the base from which they taper gradually to the point. *Veins* forked not reaching the edge. *Sori* copious terminal on the shorter anterior branch, medial a line or less apart in the rows.—*Journ. Bot.* 1877, p. 265.

Jamaica; frequent on trees in forests at 6,000-7,000 ft. altitude along the highest ridges. The lowest vein on the inferior side generally springs from the rachis, and the sori are often rather oblong or oval at first. It is perhaps of local species nearest *suspensum*, from which it is distinguished by its stiff subulate scales of the rootstock, bright peculiar lurid colour, stiff erect habit, oblique pinnae, forked veins and naked surfaces. It is one of the most beautiful of the high mountain tree Polypods.—Endemic.

47. *P. Rookenadmae*, JENM.—*Rootstock*, strong, shortly, repent or sub-erect, densely dotted with castaneous, subulate ciliate-edged reticulated scales. *Stipites* few, tufted or contiguous; sub-erect, wiry dark brown, slightly ciliate, 7-10 in. l. *Fronde* arching, oblong-lanceolate base truncate 6-8 in. l., 2 in. w. subcoriaceous glabrous, dark green above very pale beneath, deeply pinnatifid. *Segments* 16-20 to a side, the upper passing gradually into the sub-entire acuminate apex 1 in. l. 2 $\frac{1}{2}$ -3 li. w. entire, acute pointed, slightly connected with a sharp sinus, at the very shortly decurrent base, the midrib concealed in the parenchyma. *Rachis* not immersed, dark and furfuraceous on both sides. *Veins* once forked. *Sori* medial, copious, round, faintly depressed, terminal on the anterior veinlets. Baker in *Trans. Lin. Soc.*, Vol. II, part 13 p. 392.

Guiana; in Thurm upper slopes of Roraima. This resembles most *brunneo-viride* but it is stronger if not more erect, the petioles stronger and longer, the fronds shorter with the segments less narrowed towards the point than obtains in

the Jamaica species. The upper and under surfaces strongly contrast in colour; the former extremely dark green, the latter as extremely light, yellowish with a bronzy tinge. The rachis is nearly concealed on both sides by its rusty coating.—Endemic.

48. *P. Kalbreyii*, BAKER.—*Rootstock* erect or short-creeping, clothed with fine dark chestnut brown reticulated ciliate-edged acuminate scales; *Stipites* tufted or contiguous, erect, wiry and stiff polished blackish, naked, or at the base a little scaly 8–12 in. l. terete. *Fronde*s erect coriaceous, gray-green, glabrous, much the broadest at the base from which they narrow gradually upwards to the terminal caudate segment which is lobed at the base, 4–7 in. l.  $2\frac{1}{2}$ –3 or 4 in. w. pinnatifid almost to the rachis. *Segments* close, erecto-spreading, linear, entire, hardly at all dilated at the obliquely adnate and slightly connected bases, lower ones  $1\frac{1}{2}$ –2 in. l.  $1\frac{1}{2}$ – $2\frac{1}{2}$  li. w. narrowing outwards to the bluntish acute point. *Rachis* dark coloured, flat or rather grooved on the under side, the upper rounded and rusty pubescent. *Veins* oblique and with the midribs immersed and concealed. *Sori* round, medial not touching but covering most of the under surface. Baker in Trans. Lin. Soc. Vol. II, par. 13, p. 291.

Guiana; in Thurm n. 86, upper slopes of Roraima. This is well marked from its neighbours in Guiana, by the very long slender wiry almost black petioles, and short relatively broad fronds which narrow gradually from the truncate base to the caudate terminal segment, which resembles the lateral ones in form except that it is lobed at the base. Gathered first in Ocaña, New Grenada, 6,500 ft. altitude by Kalbreyer.

49. *P. firmum*, KLOTZSCH—*Rootstock* erect, or sub-erect, often elongated, clothed with dark-brown acuminate reticulated scales. *Stipites* tufted, 1– $1\frac{1}{2}$  in. l., stiff dark coloured puberulous, and dark ciliate down the face, at length naked beneath, scariose or cartilaginous margined. *Fronde*s lanceolate or oblong-lanceolate, stiff erect, 5–8 in. l.,  $1\frac{1}{4}$ –2 in. b., pinnate reduced about equally to both ends, with a caudate 1–2 in. l. sub-entire segment at the apex, toward which the lateral pinnae gradually dwindles, rigid, coriaceous opaque very dark-green above, the reverse paler, naked, except on the ribs beneath and on both sides of the stiff black hispid rachis. *Pinnæ* entire even and revolute edged, stiff linear acute-pointed spreading but rather upcurved,  $\frac{1}{2}$ –1 in. l., 1– $1\frac{1}{2}$  li. b, fully adnate at the base and rather dilated more so on the upper than the inferior side, leaving an open space equal to their own width between the outer part of the segments, the reduced basal ones small and deltoid, midveins distinct black and thread-like the lateral obscure, simple reaching the margins. *Sori* dorsal medial, 6–12 or more to a side, capsules not mixed with hairs.

Jamaica; infrequent on the branches of trees above reach from the ground at 6,000–7,000 feet altitude in forests. This is intermediate between *rigescens* and *apiculatum* resembling both, but partaking more of the rigid habit of the former, from which it may be distinguished at sight by the broader fronds linear open pinnae which are only about half as many in number, the black midvein not concealed in the pagina, and the absence of hairs among the sporangia. It may be regarded as first of those species in which the midrib of the pinnae is exposed.—New Grenada.

This number has been since described by Maxon in Jamaica Bulletin 1904 as *P. aromaticum* Maxon. See Appendix. The Editor collected it at Grant's Peak, Jamaica, 1884, and has specimens.

50. *P. apiculatum*, KZE.—*Rootstock* strong, short, clothed with dense dark-hair-like ciliate scales. *Stipites* subtufted, erect  $1\frac{1}{2}$ -3 in. l. grayish puberulous. *Fronde*s, erect coriaceous, grayish green, 4-6 in. 6-1  $1\frac{1}{4}$  in. b. pinnate with an entire caudate terminal segment like the lateral ones, the base truncate and not so little reduced. *Segments* close linear, spreading nearly horizontal  $\frac{2}{3}$ -1 in. l. 1-1 $\frac{1}{2}$  li. w. acute, the base slightly dilated and fully adnate, the margins even. *Rachis* dark coloured, rusty pubescent or puberulous; other surfaces nearly or quite naked. *Veins* simple, very oblique immersed and obscure, not reaching the edge. *Sori* round, terminal on the thickened ends of the veins, but medial and the rows filling the space between the mid vein and margins.—Hooker and Baker, Syn. Fil., p. 332.

Guiana; upper slope Roraima in Thurm n. 379, collected there by Appun previously. This most closely resembles *firmum* in size and general habit and physiognomy, but that is a more rigid darker plant with segments more falcate and a longer terminal one. It also presents resemblance with some of the smallest states of the *pectinatum* group especially of *P. plumula*, but the texture is coriaceous and not at all elastic.—Venezuela, Columbia and Brazil.

51. *P. taxifolium*, LINN.—*Rootstock* creeping, short and elongated, and fasciculate, strong, clothed with dark brown linear-acuminate scales. *Stipites* tufted or sub-tufted strong, 3-6 in. l., and with rachis dark deciduously villous, with spreading long tawny hairs which ultimately turn blackish. *Fronde*s lanceolate or oblong-lanceolate acuminate  $\frac{1}{2}$ -1 $\frac{1}{4}$  ft. l., 1 $\frac{1}{2}$ -3 in. w., reduced both ways, pinnate subcoriaceous, pellucid, naked, or with a few marginal hairs, the upper side glossy, dark-green, the under paler and nearly glaucous. *Pinnæ* linear, entire even-edged, very numerous and close, spreading horizontally, straight, obtuse-pointed 1-1 $\frac{1}{2}$  in. l., 1 $\frac{1}{2}$ -2 li. b., adnate and equilateral at the base, the lower ones gradually reduced and shortly separated dilated and (in the larger fronds) slightly arched on each side. *Veins* straight oblique, conspicuous, dark and raised beneath as in the thread-like mid-rib, simple, not reaching the margins. *Sori* sub-marginal, terminal, reaching from the base to the apex of the pinnæ, with frequently a crustaceous scale one each on the upper-side. *P. L'Herminieri*, Fée, Ant. t. 12.

Jamaica; frequent on trees 7,000 ft. altitude on the highest ridges and peaks, plentiful on the higher slopes of Blue Mountain and other peaks. This belongs to the *pectinatum* group from the other species of which its stiff texture and simple veins which are pellucid in live plants, and submarginal sori distinguish it. The plant described by Grisebach under this name with most veinlets 2—"fid" seems to be the next species.—West Indies, Ecuador, Brazil.

52. *P. plumula*, H. B. K.—*Rootstock* strong, short creeping, densely clothed with dark very fine scales. *Stipites* subtufted, strong, erect, dark or ebeneous and rather glossy, 2-6 in. l. puberulous or naked with faint marginal lines. *Fronde*s  $\frac{1}{2}$ -1 $\frac{1}{4}$  ft. l.  $\frac{1}{2}$ -3 in. w., erecto spreading oblong lanceolate acuminate somewhat reduced or not at the base, pinnate. *Pinnæ* horizontal but often rather upcurved, very numerous and close, linear acute or obtuse rather dilated and fully adnate at the equal sided or more often shortly surcurrent base, 1-1 $\frac{3}{4}$  in. l. 1-1 $\frac{1}{2}$  li. w. the lower ones hardly, if any more open than the rest, elástico-papyraceous, naked or glandulose, puberulous with a few minute fugacious ciliæ on the even margins and the ribs dark

green. *Rachis* strong dark or ebeneous and sub-glossy glandulose and rusty puberulous above, with a few minute deciduous brown scales beneath. *Veins* obscure immersed forked. *Sori* copious, terminal, on the shorter anterior branch, contiguous in two long bright-yellow rows, that occupy nearly all the space between the dark thread like midrib and margins. *P. elasticum*, Rich., Eat. Fern. N. Am. p. 63. *P. pulchrum* M. and G. *P. Schkuhri* Raddi.

Jamaica; common on open rocks and banks at nearly all elevations up to 5,000 ft. altitude. Variable in size but well marked from its allies, by its copious horizontal close and very narrow pinnæ and long rows of conspicuous yellow sori. The substance is so elastical that in dry weather the fronds curl up, expanding again with rain. The sori do not reach quite to the rachis so that there is a naked band down the centre of the frond which in many cases gradually broadens toward the base. It is probably found on most of the West Indian Islands. Pl. Fil. t. 89. (*P. plumula*, Willd is either this or *taxifolium*.)—Mexico and Guiana.

53. *P. pectinatum*, LINN.—*Rootstock*, strong, short creeping, densely clothed with small dark brown subulate scales; *Stipites* contiguous and subtufted or apart, strong or slender, usually dark coloured, puberulous, or slightly ciliate, often slightly margined rarely a span long. *Fronds* 1–2 ft. l. 2–5 in. w. oblong lanceolate pinnatifid almost to the dark coloured puberulous, naked or slightly ciliate rachis, elástico-chartaceous; dull, nearly or quite naked, gradually, or more or less abruptly reduced at the base: *Pinnæ* horizontal straight very numerous, linear-ligulate acute or bluntish at the end, close, but broadening to, and rather dilated at the base, the sinus sharp or rounded adnate confluent and nearly equilateral 1–2½ in. l. 2½–4 li. w. the inferior reduced and decurrent, through deltoid, to broad shallow scallop-shaped lobes ¼–½ in. w. and less than a line deep, which form a wing to at least the upper part of the stipites. *Veins* once or twice forked *midrib* slender black wavy toward the end. *Sori* medial, round terminal on the lowest anterior veinlet 1–1½ l. apart in the rows. Pl. Fil. t. 83. Eat. Ferns. N. Am. pl. 42.

(A.) Var. *caespitosum*.—*Rootstock* erect, or oblique, *stipites* tufted 1–3 in. l. dark. *Fronds* erect, few, 1¼ ft. l. 1½–2½ in. w. gradually reduced at the base to the membrane margined stipites, pinnæ 2–2½ li. w. blunt or rounded, rachis and ribs puberulous. *Veins* once forked shorter of the edge, the anterior fertile conspicuously shorter.

(B.) Var. *Wagnerii*, METT.—*Rootstock* more decidedly woody ¼ in. thick, scales fine and very dark. *Fronds* 1–1½ ft. l. 2–3 in. w. *Stipites* and rachises slender but stiff pinnæ blunt or rounded about 2 li. w. texture membranous and elastical; surfaces more decidedly glabrous. *Veins* usually once forked, the outer branch much curved along the margin to the next one, where it is free or united to a short spur; *Sori* medial on the shorter anterior branch. *P. Wagnerii*, Mett.

Jamaica, Dominica, St. Lucia, Grenada, Trinidad and Guiana; common at all elevations on open or shady banks, rocks and trees up to 5,000 or 6,000 feet altitude variable including three or four distinct forms. It is marked by its almost or quite naked surfaces, thin elastic texture lower pinnæ suddenly or not reduced to auricles, sometimes into a scalloped wing along the stipites, and medial rather small yellow circular sori. The rootstock is repent with the fronds usually contiguous and erecto-drooping. (A) grows under shade at Old

England at 4,000 feet altitude. Its rootstock is upright or oblique with the fronds tufted at the summit, shuttle-cock-like in form; the rachis freely puberulous a pellucid plait running from the sinuses to the rachis. This I have gathered also plentifully in Guiana.

(B) is a slender but stiff plant with longer wiry stipites, and fronds more abruptly reduced at the base. The *veins* are usually once forked, but the outer branch curves formed by the margin so much that it occasionally unites with the next and so forms an areole with an included sorus as in *goniophlebium* but to which there are no external veinlets.

54. *P. paradisea*, L & F.—*Rootstock*, strong, stout, short creeping clothed with slender brown linear small scales. *Stipites* subtufted or contiguous, strong, erect,  $\frac{1}{2}$ –1 ft. l. dark brown viscid puberulous or slightly ciliate. *Fronde*s  $1\frac{1}{2}$ – $3\frac{1}{2}$  ft. l., 4–10 in. w. elastico—chartaceous slightly viscid puberulous, at length naked, dull, grayish or brownish green, pinnatifid almost to the strong dark brown or blackish viscid puberulous and rather rusty tomentose rachis. *Pinnæ* very numerous close, horizontal, ligulate 2–5 in. l., 3–5 l. w. obtuse or rounded at the apex, dilated at the base more usually on the upper side, adnate and confluent, sinuses, acute in the upper part of the frond, gradually widening to broadly V shaped at the bottom with curved sides, the lower pinnæ more or less suddenly reduced through broad much dilated shallow segments. *Veins* fine, oblique twice forked the lowest shorter, anterior branch fertile at the end, all usually free but casually the outer curved ones united; *Sori*, suboval, in the medial row between the raised dark midrib and margins, pale yellow; receptacles elongated.—Lang and Fisch., p. 11. t. 11.

Jamaica; common on open banks and rocks, from 3,000–6,000 ft. altitude. A much stronger and more robust plant than the preceding, but with the same texture differing by the larger size, suboval sori and glandulose—puberulous or ciliate and rusty surfaces. The lower segments are dwarfed to mere uneven membranous margins, on the upper part of the stipites.—West Indies, Guiana, Brazil.

55. *P. simile*, LINN.—*Stipites*, 9–18 in. l., rather slender, naked. *Fronde*s 2– $3\frac{1}{2}$  ft. l., 4–6 in. w., pendent, fully pinnate at the truncate base, above this deeply pinnatifid, elastico-chartaceous, naked green to the strong channelled dark coloured naked rachis. *Pinnæ* spreading, apart, the lower ones sub-distant broadly adnate by the expanded base, the upper ones connected by a narrow membrane, and  $\frac{1}{2}$  in. w. open rounded sinus; linear ligulate 2–3 in. l.,  $\frac{1}{2}$ – $\frac{2}{3}$  in. w., even margined obtuse. *Veins* free, 2–3 times forked. *Sori* uniseriate terminal on the lower anterior veinlet. Sloane Cat. p. 16, Hist. p. 77, tab. p. 32, pls. p. 51.

Jamaica; this belongs to the *pectinatum* group of species, and has only been collected by Sloane. It presents a different aspect from any of the other members of that group I have seen. From the other larger States it is marked by its glabrous surface, uniformly broadly open pinnation, more often branched venation and long pendent habit. Sloane describes it as five feet long, having a petiole  $1\frac{1}{2}$  ft. long. His specimen from which I have taken the foregoing description is 3 ft. long in the front and 15 inches in the petiole.—Endemic.

56. *P. dissimile*, LINN.—*Rootstock* fleshy, creeping, stoutish, densely clothed with bright coloured much acuminate, scales. *Stipites* apart 4–8 in. l. grayish, scaly at the very base. *Fronde*s

oblong-lanceolate  $1\frac{1}{2}$ - $2\frac{1}{2}$  ft. l. 4-6 in. w. pinnate the upper part deeply pinnatifid ending in a pointed subentire segments. Membrano-chartaceous, pellucid naked, or the ribs puberulous above: pale or dark green. *Pinnæ* spreading oblong-lanceolate acuminate or acute even-edged or crenulate repand, all, or the lower ones at least, apart, but not distant  $2\frac{1}{2}$ - $3\frac{1}{2}$  in. l., 1 in. w. contiguous and narrowly confluent in the upper part, below this more or less adnate, chiefly on the upper base, the lower ones almost or quite free and usually narrowed or rounded, often auricled or lobed on the inferior base. *Rachis* rather slender, grayish or dark brown, puberulous or naked with slight marginal lines. *Veins* two or three times forked, the thickened apices not reaching the margins the lowest anterior branch fertile at the end. *Sori* yellow oblong or oval, the rows nearer the pale raised midrib than the margins, receptacles elongated. *P. sororium*, Kth.

Jamaica; frequent on rocks and trees chiefly the former in very moist woods among the lower hills, ascending to 2,000 ft. altitude, well distinguished by the alternately branched, little oblique veins thin texture adnate pinnæ and bright aureate oval sori. The lower veins near the base of the pinnæ casually unite the branches of the same group often connecting. In some fronds the auricle or lobe at the base of the pinnæ is not shown, while in others all the unconnected ones have it  $\frac{1}{4}$ - $\frac{1}{2}$  in. deep.—West Indies, Cuba, Mexico to Peru.

57. *P. microchasmum*, BAKER.—*Rootstock* shortly repent, rather slender, clothed with bright brown scales. *Stipites* apart, erect,  $1\frac{1}{2}$ -2 in. l., pale brown or stramineous slender, glabrous, winged to the base where there are few scales like those of the rootstock. *Fronde* oblong-lanceolate, 5-8 in. l.,  $1\frac{1}{2}$ -2 in. w., pinnatifid to the narrowly winged rachis, or fully pinnate below, with an entire terminal segment, light green, darker beneath; the surfaces naked except on the slender rachis beneath, which is clothed with deciduous dark-brown minute and very acuminate scattered scales. *Pinnæ* spreading obliquely, fully adnate and all but the lowest contiguous,  $\frac{1}{2}$ -1 in. l., 2 li. b., rounded at the end and open with a more or less rounded oblique sinus, between the margins slightly notched at intervals. *Veins* obscure, slender, simple or forked, terminating within the margin in pellucid clavate apices. *Sori* circular, medial between the midrib and margin terminal on the anterior branch of the veins somewhat immersed.—Baker in Journal of Botany Vol. 25, p. 44.

Jamaica; gathered at Tweedside by Mrs. Barrington Baker, differs only from *P. vulgare* of the north temperate zone by its more slender rootstock, and winged petioles. The only two fronds I have seen, are the size described. The lower pinnæ are most open between with a deep well rounded sinus; in the upper ones the sinus are acute. The notches of the otherwise even and straight margin are shallow, but regular and distinct. On the upper side there is a cavity over the pellucid and thickened apex of each vein. The sori too are slightly depressed. Including the wings, the petioles are 1 li. w.—Endemic.

58. *P. plebeium*, SCH.—*Rootstock* strong, free-creeping, clothed with grey palæ; *Stipites* scattered erect chestnut, brown 3-6 in. l. the small appressed scales at length deciduous. *Fronde* erect, elástico coriaceous, beneath and on the rachis freely sprinkled with small brown or greyish scales, deeply pinnatifid (or fully pinnate at the base) 6-10 in. l. 2-3 b. the base truncate and apex blunt. *Pinnæ*

1-1½ in. l.  $\frac{1}{4}$ - $\frac{1}{3}$  in. w. spreading contiguous with an open rounded sinus between leaving the rachis slightly winged, linear-oblong, the end rounded, the base expanded: margins crenato-sinuato, midribs mostly covered in the parenchyma. *Veins* immersed, obscure; *Sori* in a single series between the midrib and margins. Syn: Fil. p. 336.

Trinidad; gathered by Purdie: The habit is that of the European *P. vulgare*.—Mexico to Peru.

59. *P. melanotrichum*, BAKER.—*Rootstock* erect or oblique, clothed with minute brown scales. *Stipites* tufted erect, filiform brown,  $\frac{1}{2}$ - $\frac{3}{4}$  in. l., naked or slightly ciliate. *Fronde*s delicate in texture, very pellucid, light yellowish green, naked; 3-5 in. long,  $\frac{3}{4}$ -1 in. w., pinnate or bi-pinnatifid, generally more or less reduced at the base. *Pinnae* numerous spreading  $\frac{1}{2}$ - $\frac{3}{4}$  in. l., 1½ li. w., approximate cut along both sides more than half way to the hair-like midrib, into oblique sub-deltoid very finely sharp pointed segments about  $\frac{1}{2}$  l. w. *Rachis* blackish, very slender and thread-like, rather flexuose, nearly or quite naked. *Veins* simple, short and spur-like, clavate, not entering the segment but falling short at the base. *Sori* round, terminal on the sinus and slightly impressed one at the base of each lobe, forming a row on each side of the slender mid-vein which is immersed in the parenchyma.—Baker in Trans. Linn. Soc., Vol. II, part 13, p. 292.

Guiana; mountain slopes below Roraima; in Thurm, n. 125. A very delicate plant, the reticulated cells of which can be seen with a lens in the translucent substance, allied to the next species and *P. achilleæfolium* of Ecuador and Brazil, but with little affinity to any other member of this Flora. It has the texture of some of the thinner *Asplenias*, resembling small states of *Asplenium bissectum* with equally sharp but less firm teeth. The finely subulate teeth contribute a characteristic aspect. The membranes extending from the base of the pinnae, surcurrent and mostly free on one side, decurrent and adnate on the other, from an uninterrupted wing to the filiform rachis.—Endemic.

60. *P. xiphopteroidæfolium*, JENM.—*Stipites* tufted, wiry, filiform, stiffly erect, brown, naked slightly margined to the base,  $\frac{3}{4}$ -1½ or 2 in. l. *Fronde*s bi-pinnatifid firm, erect, dark green, naked—4-6 in. l., 1½-2 in. w. suddenly reduced at the base to minute deltoid spur-like segments, the apex terminating in a pinnatifid pinna 1-1¼ in. l. broadest at the base, but otherwise similar to the lateral ones; pinnae spreading apart, linear  $\frac{3}{4}$ -1¼ in. l., 1½-2 li. w. broadly adnate and narrowly decurrent forming a slightly interrupted wing to the brown wiry slightly flexuose rachis, terminating in a minute obtuse lobe, cut two-thirds to the dark filiform flexuose mid-vein into obtuse obliquely deltoid decurrent segments  $\frac{1}{2}$ - $\frac{3}{4}$  li. w., and deep, with an open oblique sub-acute sinus between. *Veins* simple or forked not excurrent. *Sori* terminal on the short spurlike anterior branch, one to each segment.

Cuba; gathered by Eggers, matted with other species, and apparently not detected; near to *P. melanotrichum* Baker of Roraima, British Guiana, but distinguished by the obtuse—not finely subulate final segments, forked veins, the sori on the short nearly basal spur, much longer petioles with minute spur-like segments apart near the top, darker colour and the distinct terminal segment similar to the lateral and into which the latter abruptly pass. Though the fronds are larger, the pinnae are only half the number of those of *melanotrichum*. The cutting of the pinnae is usually like that of *Xiphopteris* fronds.



61. *P. hastæfolium*, SWARTZ.—*Rootstock* small, upright, with strong very descending roots, the crown clothed with small brown scales. *Stipites* densely cæspitose, 1–2 in. l. grayish, clothed with scattered deciduous scales, like those of the rootstock. *Fronde*s erecto-spreading, lanceolate, 5–10 in. l. 1–2½ in. w. the apex terminating in a lobato-entire point, gradually dwindling to nothing at the base; chartaceous or sub-coriaceous, naked, dark-green above, paler beneath. *Pinnæ* numerous, usually contiguous, nearly or quite horizontal, ¾–1¼ in. l, 1½–2½ l. b., linear-oblong or ligulate, the point blunt, the base quite free and dilated equally on each side, into a pair of sharp auricles, lower segments minute, triangular with sharp angles. *Margins* even or faintly crenulate. *Rachis* and ribs puberulous, the former grayish and channelled. *Veins* forked but simple in the outer part. *Sori* dorsal near the forking, single or double, the rows rather nearer the midrib than margin.—Icon. Fil. t. 203. *Aspidium* Gr.

Jamaica; common on wet rocks and banks among the lower hills and ascending to 2,000 feet altitude. Well marked by its small size and densely tufted habit, with the hastate pinnæ. Its rootstock is often 2–3 in. l., composed mainly of strong wiry compact descending roots, which spread only when they reach the surface of the rock on which the plant is growing. The sori are as often double as single, one being borne near the base of each limb of the veins, so close together that they appear single. Grisebach must have detected trace of an involucre as he removed the species to *Aspidium*.

62. *P. blechnoides*, SWARTZ.—*Rootstock* strong, decumbent, shortly repent. *Stipites* contiguous, 2–4 ft. l. erect, brown, furfura-ceous, but at length glabrous, channelled. *Fronde*s pinnate, sub-coriaceous, glossy, bright green pellucid, 2–4 ft. l., 1¼–2¼ ft. w., with a terminal pinnæ and numerous alternate, subdistant, or approximate, erecto-spreading lateral ones which are stipitate and cuneate at the base, acuminate or cuspidate and serrate or crenate at the apex, the lateral margins entire, or faintly crenate—serrate 10–16 in. l., 1¼–1¾ in. w. *Rachis* strong, brown channelled decidedly rusty furfura-ceous. *Costa* prominently raised beneath. *Veins* very numerous, slightly oblique ½ li. apart simple or forked from the base, rarely higher, raised slightly, curved at the margin, where the cartilaginous pellucid marginal thread connects them. *Sori* dorsal, one to several, to a vein; round oval or oblong sprinkled generally over the surface or confined near the costa. *Sporangia* mixed with reddish wool. Gr. Fl, B.W.I. p. 697. *P. Parkeii* H. K. and Grev. Icon. Fil. t. 233. *Alsophila*, Hook. and Baker Syn. Fil. p. 32. *A. rostrata*, Mart. *Metaxya*, Pr. *Amphidesmium*, Scholt.

Guiana; the most common of all Ferns under forests over all the great alluvial region and extending to the sandstone region. Trinidad; the chief variation is in the sori which in some cases are confined to a band close along each side of the costæ and in others extending to the margins, and that pass, from round to oblong, and sometimes linear in shape. The receptacles are quite superficial varying from punctiform to linear, but the dense tomentum, (which however varies in degree) in which the sporangia are mixed, has led authors to transfer it to *Alsophila*. Very young plants are bipinnatifid, and the cutting is never entirely lost running to the cut, evident in the coarse serrature at the ends of the pinnæ.—Panama and Guatemala to Brazil and Peru.

63. *P. trinitensis*, JENM.—*Stipites* 6–9 in. l. void of vesture slightly channelled, brownish green. *Rachis* similar. *Fronde* pinnate chartaceous pale green naked, 1–2 ft. l. 1 ft. or over w. not reduced at the base, and very slightly at the apex, terminating in a simple ligulate unlobed pinnae conform to the lateral ones; *Pinnæ* spreading horizontally, almost sessile, ligulate 5–6 li. w. 9 in. l. finely serrato-acuminate, the base truncate, not widened, slightly contracted in the lower ones, the margins uniformly throughout dentate or bi-tridentate. *Veins* copious simple close, grouped running to the margin, terminating in the serrations; *Sori* copious medial on the veins, forming two or three rows no involucre observable.

Trinidad; communicated by Hart, at first sight this might be mistaken for *Polypodium flavopunctatum*, Kaulf (*Aspidium rotundatum*, Willd.) a plant very common in Trinidad, but which on comparison is seen to be very distinct the pinnae are narrower in this, they are uniformly free at the base, slightly narrowed there with a terminal segment, simple only serrated, just like the lateral ones, and the translucent spots are quite absent. Whereas *P. flavopunctatum* has pinna twice or three times as broad with copious translucent spots the upper pinnae roundly lobed along the margins freely translucently spotted, the upper two-thirds broadly adnate and decurrent on the rachis passing gradually into the lobed apex of the frond. Plumiers, Fil. t. 38, is a very good figure of *P. flavopunctatum*.—Maracas Falls, Trinidad.

64. *P. flavopunctatum*, KAULF.—*Rootstock* stout, decumbent. *Stipites* strong, erect, dark-brown deciduously scaly below channelled  $1\frac{1}{2}$ –2 ft. l. *Fronde* ample, 2–3 ft. l.,  $1-1\frac{1}{2}$  or 2 ft. w. pinnate, the upper part pinnatifid, truncate and not reduced at the base, thin membrano-chartaceous and freely pellucid dotted, naked, dark-green above, paler beneath. *Rachis* strong channelled sub-angular slightly fibrilose beneath. *Pinnæ* numerous, spreading 8–10 in. l., 1 in. or rather more or less wide, serrato-acuminate sessile, the upper ones adnate on the inferior base and decurrent, free on the upper which is the deeper side and developed into an enlarged lobe; lower ones quite free, shortly stipitate and rather rounded, cut  $\frac{1}{5}$ – $\frac{1}{4}$  to the costa into shallow rounded oblique lobes, which are  $1\frac{1}{2}$ –2 l. w. and slightly crenate. *Veins* pinnate about 4–5 to a side, simple, the basal ones not uniting but falling suddenly short within the margin. *Sori* medial, dark when dry.—*Aspidium rotundatum*. Willd. Pl. Fil. t. 38.

A very fine species marked by the basal veins not uniting but curiously falling short in the middle, the pellucid dots scattered over the surface, and the upper pinnae adherent at the base on the lower side and decurrent on the rachis while free and enlarged on the upper side. It resembles very much some forms of *Nephrodium serrulatum* Mett., which is sometimes confounded with it, but from which the free veins clearly distinguish it. It is ascribed to Jamaica by Hooker on the authority of Wilson, N. 516, no locality mentioned.—West Indies, Trinidad.

65. *P. tijuacanum*, RADDI.—*Rootstock* erect, or sub-repent densely clothed with a tufted mass of long linear-acuminate, bright brown or ferruginous scales. *Stipites* caespitose, erect, 12–20 in. l., the scales of the rootstock ascending their base, above this plentifully clothed with squarrose criniferous, scales, which are deciduous and leave a warty surface; *Fronde* thin but firm dark green, chocolate when dry  $1\frac{1}{2}$ – $2\frac{1}{2}$  ft. l., 10–15 in. w. bi-pinnatifid, passing gradually upwards into the acuminate apex, the base not reduced, pinnatifid or lobed;

abundantly and minutely pellucid-dotted; slightly ciliate on the margins; *Costæ* rusty tomentose above; and scaly especially at the base beneath; *Rachises* plentifully clothed like the stipites. *Pinnæ* distant, spreading horizontally 6-9 in. l.  $1\frac{1}{4}$ - $1\frac{1}{2}$  in. w. acuminate serrate the lower part rather narrowed to the stipitate base; cut about half-way to the costæ into broad flat rather oblique appressed lobes, which are 3-4 li. w. even or crenate margined with no open space between them; *Veins* simple very oblique and curved 8-10 to a side the lowest pair running into the sinus; *Sori* medial, extending to the top of the lobe, evident on the upper side.—Hooker and Baker, Syn. Fil., p. 305.

Guiana; in forests on the banks of the Cange and Corentyne river, in the alluvial region, moderately common. Well marked by its dark colour, dense squarrose dark criniferous vestiture of stipes and rachis, pinnæ cut as a rule only half way to the costæ and broad flat thin lobes.—Brazil to Peru.

66. *P. refulgens*, KLOTZSCH.—*Stipites* a foot l. clothed with bright brown scales throughout. *Fronde* a foot l., and foot and a half br., herbaceous densely pubescent above, on the rachis—ribs—and veins, beneath clothed with mixed yellowish glandular hairs and reddish scales. *Pinnæ* 6-8 in. l.,  $1-1\frac{1}{4}$  in. b., the upper sessile, those below narrowed and stipitate at the base, lobes close, oblong  $\frac{1}{4}$  in. br., the margins slightly dentate. *Veins* simple, 8-12 to a side, *Sori* medial. Hooker and Baker, Syn. Fil., p. 307.

Guiana; this I have not seen; its alliance is evidently with *tijucanum*, with a general resemblance to *Nephtrodium velleum* and *N. caripense*.—Panama and Columbia.

67. *P. pubescens*, RADD.—*Rootstock* upright, the crown clothed with few pale brown scales. *Stipites* cæspitose, erect, rather slender, a few to several inches long, channelled, gray pubescent. *Fronde* chartaceous light green pellucid, pale pubescent chiefly on the slender channelled rachis costæ and ribs  $1\frac{1}{2}$ - $2\frac{1}{2}$  ft. l. 3-6 in. w. bi-pinnatifid. *Pinnæ* numerous contiguous or apart, alternate or opposite, spreading obliquely or horizontally reduced gradually to the acuminate pinnatifid apex of the frond, and below, finally to minute distant trilobed segments, central ones  $2-3\frac{1}{2}$  in. l.  $\frac{1}{3}-\frac{3}{4}$  in. w. as wide or wider at the quite sessile base, acuminate with a serrate entire point, within this pinnatifid nearly to the costa. *Segments* horizontal or oblique,  $\frac{3}{4}-1\frac{1}{4}$  li. w.,  $\frac{1}{4}-\frac{1}{2}$  in. l. acute close, the narrow sinus acute; the margins even or faintly crenate, often a little reflexed. *Veins* simple slightly oblique 5-9 to a side, all fertile. *Sori* nearer the edge, often apparently amorphous when mature.—Radd., Plt. Brazil, t. 34.

Jamaica; common in forests and on banks, by waysides and streams, above 3,000 ft. altitude. Resembles in general aspect, the following, with which it is often associated but it is of more compact habit. Often, densely pubescent substance pale green colour and more copious sori. The habit is very erect, but the parts slender and rather fragile. In plants growing in the open, the sori generally conceals the entire under surface, passing from yellowish green to dark blackish brown at maturity.—West Indies.

68. *P. gracilentum*, JENM.—*Rootstock* upright, fibrous, an inch, or so thick, *Stipites* slender, cæspitose erect, grey green, channelled,  $\frac{1}{2}$ -1 ft. l. naked or puberulous, a few dark scales at the base; *Fronde* erect spreading, shuttle-cock form, bi-pinnatifid,  $1\frac{1}{2}$ -3 ft. l. 5-8 in. w.

weakly, dark green paler beneath naked except on the slender channelled rachis costæ and ribs, which are finely puberulous-pubescent, oblong-lanceolate tapering both up and down gradually to the apex into the lobed, serrulato-entire point. *Pinnæ* distant, the inferior dwindling to remote segments, ligulate, spreading nearly horizontally, 3-4½ in. l, 3-8 li. w. opposite or sub-opposite sessile, the acuminate point evenly-entire pinnatifid nearly to the slender slightly flexuose costæ; segment 3-5 li. l. 1-1½ li. w. blunt or subacute, open slightly dilated at the fully adnate base, the basal pair slightly enlarged, the margins even or faintly crenulate, and slightly reflexed. *Veins* simple, oblique 6-8 to a side, that on the inferior base sometimes forked raised on the upper surface; *Sori* nearly medial occupying usually all the veins, superficial or slightly sunk.

Jamaica; common from 3,500 to 5,000 ft. altitude, in grass by the sides of open shallow streams and in similar wet exposed places; of a dark green colour, and pale brown, fragile very slender vascular parts, the upper surface in some cases appearing as if crinkled from the raised venation and slightly pitted fructification. From the very apex of the fronds the pinnæ steadily widen apart downwards to 1-3 in. in the small lobate segments to which the inferior are reduced. There is a variety occupying the situations possessing the same general aspect, but with narrower quite horizontal pinnæ and close straight horizontal segments and less obvious venation. I have both also from Cuba. For many years this was referred to *N. conterminum*, Desv. A species of particularly well-marked identity but regarding which there is great confusion.

69. *P. roraimense*, BAKER.—*Rootstock* erect or oblique clothed with few castaneous scales. *Stipites* tufted, slightly paleaceous and muricate at the very base, a span or more long stramineous or brown. *Fronde* 2-2½ ft. l., 7-9 in. w., chartaceous, pellucid, bright light clear green pinnatifid. *Pinnæ* spreading horizontally quite sessile, ligulate, the finely acuminate point serrate 4-5 in. l., ¾ in. b., the lower ones reduced to mere distant segments, those above these cut down nearly to the costæ into close oblong bluntly rounded segments which are 5-6 li. l., 1½-2 li. w., the margin even or slightly crenulate, the sinus acute. *Rachis* and costæ stramineous and glossy slightly pubescent and channelled down the face; other surfaces quite glabrous. *Veins* simple, 6-7 to a side. *Sori* round medial, fugacious.—Baker in Trans. Lin. Proc., Vol. II, part 13, p. 291.

Guiana; upper slope of Roraima; in Thunb, n. 168. This is marked by its pale stramineous green colour and naked glossy surface, only the face of the costæ being slightly pubescent. It agrees entirely with *P. germanianum*, Baker of Guadeloupe (see Fée, Fil. Ant. t. 13, fig. 2) which so far as I can judge has the same colour, texture, habit, &c. The base of the frond is not gradually reduced, but two or three pairs of the lower pinnæ are smaller than those above them, and the next two or three pairs of the lower pinnæ are smaller than those above them, and the next two or three below these again abruptly reduced to segments two inches apart only ¼-½ in. l.—Endemic.

70. *P. demeraranum*, BAKER.—*Stipites* a span to a foot l. strong grayish with a fine pubescence, clothed freely with linear acuminate castaneous scales, channelled. *Fronde* subcoriaceous dark green glossy above, the surfaces slightly gray pubescent, the costæ, and strong channelled rachis very densely, 3-4½ ft. l., 8-12 in. w. oblong-lanceolate acuminate bi-pinnatifid. *Pinnæ* spreading horizontally sessile 4-7 in. l. ¾-1½ in. b., the sub-acuminate point entire, apart lower ones distant, the lowest 3-4 pairs remote and greatly reduced

at last to mere auricle like segments, all deeply pinnatifid to within  $1-1\frac{1}{2}$  li. of the costæ. *Segments* close, very slightly oblique, oblong,  $5-9$  li. l.,  $1\frac{1}{2}-2\frac{1}{2}$  li. w., even or faintly crenate at the rounded end, the inferior basal one in the upper pinnae enlarged, both reduced in the lower pinnae. *Sinuses* sharp. *Veins* simple oblique  $8-10$  to a side, raised beneath. *Sori* nearer the margin slightly elongated, deciduous. *Receptacles* ciliate and sporangia small.—Baker in, Trans. Lin. Soc., Vol. II, part 13, p. 290.

Guiana; upper slope Roraima Appun, im Thurn No. 356. A very large robust plant  $4-5\frac{1}{2}$  ft. high of very dark green colour copious horizontally spreading pinnae which become gradually more apart from the apex of the frond downward, and fugacious rather elongated sori. The habit and general aspect are exactly those of *Gymnogramme diplazoides*, Desv., but the sori are shorter.—Endemic.

71. *P. bi-pinnatifidum*, JENM.—*Caudex* slender, 6-7 ft. high. *Stipites* 9 in. l., spreading, chestnut brown, clothed with lanceolate acuminate brown scales. *Fronde* bi-pinnatifid, chartaceous, dark dull green, both sides pubescent, 2-3 ft. l. spreading, 9-12 in. w. *Pinnae* spreading, sub-contiguous, the lower 1-2 pair deflexed and little reduced, central 4-6 in. l.,  $\frac{3}{4}$  in. w, sub-acuminate, the upper ones sessile, the lower slightly stipitate, the base truncate, pinnatifid to within less than a line of the costæ into oblong round-ended close segments with a sharp sinus between. *Segments* 4-5 li. l.,  $1\frac{1}{2}$  li. w., margin even or faintly crenate in the outer part. *Rachis* stiff channelled, grayish above, costaneous beneath. *Veins* close, 8-10 to a side, lowest pair entering above the sinus, forked below the middle, the branches close. *Sori* at the forking in a line, nearer the midrib than margin; *receptacles* raised and setiferous, sporangia very copious.—*Alsophila*, Baker, Syn. Fil. p. 456.

Guiana; Quaking Creek, Appun, No. 1032, foot of Roraima, im Thurn n. 270, the form less pubescent than the latter. This resembles the *decussatum* group but the veins are forked and the rachises devoid of the glands form in that. The sub-arborescent caudex, forked veins, and setiferous receptacles led Mr. Baker to place it among the tree-ferns proper. Like *Percivalii*, it is clearly a striking and peculiar plant.—Endemic.

72. *P. ctenoides*, FÉE. - *Stipites* caespitose from a strong upright rootstock,  $1-1\frac{1}{2}$  ft. l. strong densely rusty pubescent. *Fronde* erect,  $2-2\frac{1}{2}$  ft. l., 8-12 in. w., chartaceous stiff dark green and glossy above paler beneath, slightly ciliate or naked, glandulose—puberulous beneath, the costæ hispid-pubescent, as is also very densely the rachis which is grayish or rusty and channelled. *Pinnae* spreading contiguous, sessile with a projecting gland at the base beneath 4-6 in. l.,  $\frac{3}{4}-\frac{7}{8}$  in. w. very acuminate, passing through serratures to the sharp entire point, deeply pinnatifid to within a line of the costæ the lower ones suddenly reduced to very minute segments which at intervals descend the stipites; *Segments* close, nearly straight oblong, obtuse acute, 4-5 li. l.,  $1\frac{1}{2}$  l. b., hardly dilated at the confluent base, the basal pair except in the upper part of the fronds reduced. *Margins* slightly reflexed; *Veins* simple, rather oblique pellucid while fresh 12-15 to a side; *Sori* medial soon dispersed. *Phegopteris*, Fée, Fil. Ant. t. 14, fig. 2.

Jamaica; common between 4,000 and 6,000 ft. altitude in open or shady moist situations, abundant in parts of the Government Cinchona Plantation,

near to if not identical with *P. rude* Kze., colour very dark green, texture stiffish and hard, densely rusty grey, hispid on petiole, rachis and ribs, with a general harsh feel, and slightly ciliate or not on the veins and margins. A much stronger plant than *P. gracilentum* but of similar general resemblance.

73. *P. Percivalli*, JENM.—*Rootstock* rather slender, erect several feet high. *Stipites* erecto—spreading, arising from the top of the caudex, about 20 in. l. sub-scaly and mucus coated at the base, dull brownish grey above, with a line of spines, fine and close, on each side of the face extending up to the pinnæ. *Fronde* bi-pinnatifid 3-4 f. l. dark green thin and rather pellucid; upper surface slightly ciliate on the margins and ribs, the costæ greyish tomentose, the underside sprinkled plentifully with glandular yellowish dots. *Rachis* channelled, puberulous, the same colour as the stipites. *Pinnæ* deeply pinnatifid spreading horizontally, 8-10 in. l. 1 in. w. terminating in a subserrate fine caudate end, sessile with a basal gland beneath the upper ones close, the lower  $1\frac{1}{2}$  in. apart and decurved, the bottom pair slightly reduced the lowest of all abortive and represented by two indurated warts. *Pinnule* about  $\frac{1}{2}$  in. l.  $\frac{1}{8}$  in. w. round ended, very numerous and straight in the lower half, where they are about 1 line apart with an open sinus between. above this, close and slightly curved, the bottom pair (or two or three pair) of the lower pinnæ reduced. *Margin* even. *Veins* simple, parallel, 20-24 to a side. *Sori* minute ultimately confluent, forming a continuous row on each side along the mid rib, reaching from the base to the top of the segment.—Jenm. in *Demerara Argosy*, 1883, N. 1586.

Guiana; discovered by Messrs. in Thurn and Percival, and dedicated to the latter. On the way to Mt. Ray-wa, growing in forests on the banks of a creek of the Issororo River. A fine species closely allied to *decussatum* and *Thomsonii*, but of a different colour, with narrower pinnæ than either much more pubescent costæ above, very copious resinous dots beneath, and especially remarkable for its very tall caudex, which in the plant found, (the only one yet known) was four feet high.—Endemic.

74. *P. Thomsonii*, JENM.—*Rootstock* stout, upright, often a few inches high. *Stipites* caespitose erect, 1-2 ft. l., brown, clothed downwards with membranaceous brown scales; membranaceous chartaceous pellucid, nearly naked, slightly glandulose beneath, puberulous or ciliate on the costæ and ribs, pale but vivid green and mucous when young. *Fronde* 2-4 ft. l.,  $\frac{3}{4}$ - $1\frac{1}{4}$  ft. w.; oblong or ovate lanceolate acuminate, somewhat shortly reduced at the base. *Rachis* channelled grayish puberulous or pubescent, and pale coloured. *Pinnæ* spreading numerous, contiguous, above, sub-distant below, sessile with a subdulate gland at the base, 6-8 in. l.,  $1-1\frac{1}{4}$  in. w., oblong lanceolate, acuminate with a serrato-entire point, the 2-3 lower ones reduced half or more, and often deflexed, pinnatifid to half a line of the costæ. *Segments* numerous, close, straight oblong and round-ended, confluent but not dilated, at the equal side base, 6-7 li. l.,  $1\frac{1}{2}$ -2 li. w., flat with entire margins. *Veins* simple, slightly oblique pellucid while fresh 12-15 to a side. *Sori* medial or curved, the midrib brown, constantly distinct at length dispersed.—*Journ. Bot.*, 1886. p. 272.

Jamaica; infrequent in the forest or shady places at 6,000 ft. altitude, gathered at Newhaven Gap at the top of the Cinchona plantation. Resembling

most the next species but much smaller and flaccid, with a general pale colour, distinct, never confluent sori, relatively few veins, and absence of the murication of stem and rachis, pubescent and nearly stramineous rachis. It is named after Mr. Robert Thomson.—Endemic.

75. *P. decussatum*, LINN.—*Rootstock* very stout, decumbent. *Stipites* caespitose, stout erect, not channelled dark or purple-brown 2-4 ft. l. membranous scaly throughout, and coated with glutinous mucous, biserially muricate down the sides. *Fronde*s erect, 4-6 ft. l.  $1\frac{1}{2}$ - $2\frac{1}{2}$  ft. w. subcoriaceous stiff when dry, margins entire, pale, ciliate, naked except on the ribs. *Pinnæ* numerous close, spreading horizontally sessile with a lanceolate brown  $\frac{1}{4}$  in. l. conspicuous gland at the base, 10-15 in l. about  $1\frac{1}{2}$  in. w. acuminate with a serrato entire point, pinnatifid nearly to the costæ. *Segments* very numerous, close horizontal linear oblong rounded at the end, adnate and confluent at the equal sided base,  $\frac{3}{4}$  in. l.  $1\frac{1}{2}$  li. w. *Rachis* very strong rather rounded not channelled, naked, purple muricate along the sides like the stipes. *Costæ* puberulous beneath pubescent above. *Veins* simple slightly oblique, pellucid very close  $2\frac{1}{2}$ -3 dozen to a side. *Sori* medial or nearer the midrib, copious purplish ultimately confluent. Pl. Fil. t. 24.

Jamaica; common in moist forests especially near streams at 2,000 to 4,000 ft. altitude, a fine plant of striking aspect and some peculiar features. The strong purple rachis and petiole, muricate along the sides, long horizontal pectinate pinnæ, and claret coloured confluent sori distinctly mark it.—West Indies and South America.

76. *P. caudatum*, KAULF.—*Rootstock* stout, erect, scaly. *Stipites* caespitose strong, erect, channelled paleaceous throughout but densely below, 2-3 ft. l. *Fronde*s 2-3 ft. l.  $1-1\frac{1}{2}$  ft. w. bi-pinnatifid, sub-chartaceous pellucid, with scattered pale dots, naked; only a few small scales on the costæ and ribs, pale green on both sides. *Rachis* light-coloured decidedly paleaceous, and fibrillose, but less so than the stipites. *Pinnæ* spreading, the lower ones horizontally and not, or hardly reduced, opposite or contiguously alternate, close above and sessile, apart below, and stipitate 6-10 in. l., 1-2 in. w., the lowest 1-2 pair rather deeper on the inferior side, the point finely serrato-acuminate, within this, pinnatifid to the narrowly winged costæ. *Segments* spreading but rather oblique  $\frac{1}{2}$ -1 in. l or over, 2-4 l. w. linear oblong, shortly acute or bluntish, rather dilated and confluent at the base, with a close or open sinus between. *Margins* faintly or deeply toothed throughout, sometimes lobate in the bottom pinnæ, the teeth bluntish, lowest segments in the upper side usually largest and the opposite in the inferior smaller, or in the lowest, or lower pinnæ often absent. *Veins* simple or forked, pellucid, 6-10 or 12 to a side. *Sori* mainly confined to the outer  $\frac{1}{2}$  or  $\frac{1}{3}$  of the pinnulæ nearer the midrib than margin.

Jamaica; common in damp forests near streams, principally in the mid-region of the great mountain range. In the largest fronds the inferior pinnæ are fully pinnate toward the base on the under side. When the veins are forked the longest branch terminates in the tooth, with a thickened summit, and the shorter near the sinus. The species is marked by its general pale colour, diffused paleaceous vestiture, scattered yellow pellucid dots, toothed segments, and sori on the outer part, though this last character is not absolutely constant. As mentioned under that species, this and the common form of *Asplenium conchatum* have exactly the same cutting, barren fronds of each being hardly distinguishable one from the other.—Cuba to South America.

77. *P. punctatum*, THUNB.—*Rootstock* wide creeping, rather slender, scurfy with fine rusty scales that ascend the base of the stipites. *Stipites* erect, distant, naked, channelled, castaneous and glossy 3–5 ft. l. *Fronde*s subdeltoid in outline 4–6 ft. l., 3–4 ft. w., chartaceous, naked, or slightly puberulous, viscid beneath and pale dark green above, and glossy, tri-quadrappinnatifid. *Pinnæ* petioled in distant spreading pairs, decreasing from the base of the fronds upwards, the lower ones  $1\frac{1}{2}$ –3 ft. 9–12 in. w., ovate-acuminate, the upper oblong-acuminate pinnulæ also distant, similar in shape to the pinnæ, and petiolate, those on the inferior side usually a little larger, the costulæ flattish or narrowly margined, tertiary segments distant, oblong, usually quite sessile, the outer rounded and merely crenate the inner bluntish or acuminate, lobed or deeply pinnatifid; larger ones 1–2 in. l.,  $\frac{1}{4}$ – $\frac{1}{2}$  in. w., ultimate lobes 1– $1\frac{1}{2}$  li. b., rounded and crenate. *Rachis* and *Costæ* bright and castaneous on the latter, varying to stramineous. *Veins* pinnate, the branches simple or forked in the final lobes. *Sori* copious, terminal, round or oval, rather large, submarginal one within each partially reflexed crenature.

Jamaica; frequent but not common at 4,000–6,000 ft. altitude, on the skirts of forests, open banks, and waysides. This quite identical in habit and cuttings with *Hypolepis repens*, differing only in its naked glossy surface the absence of the pale involueral marginal scales, and the sori; at first more or less clearly within the margin, dorsal or terminal on the veins. The rootstock branches and spreads widely under the surface of the ground, and the bright colouring of the surface and sori gives the ample fronds a very attractive aspect.—Widely distributed over the globe.

78. *P. rugulosum*, LABILL.—*Rootstock* slender, widely repent. *Stipites* apart, erect, dark brown channelled freely paleaceous and slightly asperous, 1–3 ft. l. *Fronde*s  $1\frac{1}{2}$ –3 ft. l.— $1\frac{1}{2}$ –3 ft. w. erect, tri-pinnate, deltoid-oblong thinly chartaceous, viscid, fulvous, pellucid. *Rachis* costæ and ribs, densely clothed with appressed inbricating glossy bright brown scales and faintly asperous. *Pinnæ* spreading nearly horizontally distinct in opposite or sub-opposite pairs 1– $1\frac{1}{2}$  ft. l. 3–6 in. w. the upper sessile, the lower petiolate. *Pinnulæ* oblong, acute, fully pinnate only at the sessile base, 2– $3\frac{1}{2}$  in. l. 1 in. w. segments  $\frac{1}{4}$ – $\frac{3}{4}$  in. l. 2–3 l. w. oblong adnate decurrent. upper base decurved, lobed, dentate or crenate the end rounded and even. *Veins* once or twice forked near above the furcation, bright fulvous.

Jamaica; infrequent in the higher mountain regions, on banks skirting byeways and forests and other half open places easily mistaken for *Hypolepis*, *repens*, and *H. Purdiana* with which it conforms in habit and cutting differing by the dorsal medial sori.

79. *P. nigrescentium*, JENM.—*Rootstock* stout, decumbent, or oblique, shortly repent dark scurfy clothed with a few minute dark brown scales. *Stipites* more or less tufted erect—3–7 in. l. slightly channelled, puberulous, a few minute dark brown scales at the base. *Fronde*s erect, pinnate subcoriaceous, dark green glossy, pellucid, glabrous, the rachis brown, puberulous, 3–5 in. l. 2–4 b. composed of 3–7 spreading sessile oblong lanceolate acuminate pinnæ and a similar terminal one, which are  $1\frac{1}{2}$ –3 in. l.  $\frac{1}{3}$ – $\frac{1}{2}$  in. w. the upper ones truncate the lower rounded or sub-cuneate and not reduced, repand, the margins slightly lobed or serrulate crenate. *Veins* 4–5 to a side, the opposite ones connecting at an angle with an intermediary that



runs to the sinus, pellucid at the top. *Sori* copious occupying all but the exterior veins, and covering most of the surface.

Jamaica; among the lower hills St. Mary's parish. Intermediate between *crenatum* and *obliteratum* in its general characters. Its characteristic features are the relatively strong rootstock small densely grouped fronds, repand and orin kled very slightly cut pinnae, and copious sori. As a rule the terminal segment is shortened, which gives the fronds an oblong or quadratiform aspect that is very characteristic. As in all these species, in the very early stage of the sori a rudimentary trace of hardly more substance than a film of an involucre can be detected with a lens.—Endemic.

80. *P. obliteratum*, SWARTZ.—*Rootstock*, subterranean, strong, short, creeping. *Stipites* subtufted  $1\frac{1}{2}$ -3 ft. l. erect, grayish or dark coloured, with a few deciduous purplish scales at the base, sub-angular hardly channelled. *Fronds* erect ovate oblong  $1\frac{1}{4}$ - $1\frac{3}{4}$  ft. l.  $\frac{3}{4}$ - $1\frac{1}{4}$  ft. w. sub-coriaceous naked or glabrescent beneath, dark green, pinnate, not reduced at the base. *Pinnæ* apart or sub-distant spreading or erecto-spreading, 6-9 to a side with a similar free terminal one, 5-8 in. l.  $\frac{3}{4}$ -1 in. w. or rather over w. those of the barren fronds being the wider, the base subentire crenate and shortly stipitate the upper ones more rounded and often slightly adnate, the apex acuminate rather long-pointed, and entire, the margins within very shallowly cut into broad appressed or obliquely rounded lobes, which are 2-3 li. b. and less than a li. d.; *Veins* pinnate, branches simple 6-9 to a side, most connected with the casually interrupted vein—that runs to the sinus. *Sori* copious, dorsal biserial, extending from the costæ to the margins and to the acuminate points of the pinnae.—Hook Icon. Plt. third series pl. 1669.

Jamaica; common in woods and stony half open ground among the lower hills up to 2000-3000 ft. altitude. In the early stage of growth trace of a rudimentary involucre is observable which however soon disappears; intermediate between *crenatum* and *tetragonum* and is distinguished by its stiff texture very slightly incised pinnae with generally appressed flat lobes naked surfaces, dark colour and purple sori. *Goniopteris hastata*. Fée—(*Nephrodium*, Jenm.) and *G. Rivoirei*, Fée Fil. Ant. t.—18, are near this.—Cuba, Guadeloupe, Mexico.

81. *P. crenatum*, SWARTZ.—*Stipites* sub-tufted erect from a creeping underground rootstock, 1-2 ft. l., strong, light coloured, glabrescent, sub-angular channelled. *Fronds* erect,  $1-1\frac{1}{2}$  ft. l. and nearly as w., at first flaccid, at length thinly chartaceous pubescent mostly on the veins dark dull green, composed of 3-6 pairs of spreading or erecto-spreading lateral pinnae and a free similar large terminal one. *Pinnæ* 6-9 in. l.,  $1\frac{1}{2}$ -2 in. b., shortly acuminate, the lower ones sub-cuneate at the base, the upper rounded, lowest pair as large or larger, the uppermost one often shortly adnate to the pubescent or naked sub-angular rachis. *Margins* sub-entire or cut into very shallow rounded or rather appressed lobes which are a  $\frac{1}{4}$  in. w. and hardly more than  $\frac{1}{2}$  l. d. *Veins* pinnate, the branches simple, nearly all connected with the veins running to the sinus, the latter casually interrupted. *Sori* copious round or oblong, dorsal, the lines reaching from the midrib to the margin.

Common in woods and shady places among the lower hills; very well marked by the few large slightly cut pinnae, thin texture and pubescence. The pinnae are sometimes bulbiferous near the base on the upper side, and the terminal one is not more lobed than the lateral. Its nearest alliance is with the next species. I have a Jamaica specimen each sorus covered completely with a much ciliated involucre.—West Indies to Brazil.

82. *P. androgynum*, POIRET. *Stipites*, erect, channelled, pubescent, light brown 1-2 ft. l. *Fronde*s bi-pinnatifid herbaceous, dull green, oblong-lanceolate, the apex pinnatifid into which the pinnæ abruptly pass, base not reduced. *Pinnæ* spreading obliquely, lower ones distant subcuneate and stipitate at the base, the upper closer, truncate, and sessile at the base tapering gradually to the acuminate subentire part 4-6 in. l.,  $\frac{2}{3}$ - $\frac{3}{4}$  in. w., cut half or rather more down the costæ into flat rather oblique rounded close entire lobes which are  $1\frac{1}{2}$  li. w., 2-3 li. d. to the sharp sinus. *Rachis* and costæ light coloured stellate pubescent, both margins and surfaces lightly pubescent. *Veins* close, simple about 10 to a side, the lowest opposite pair united sending a branch to the sinus where the next approach. *Sori* copious in a line on each side near the midrib reaching from the costa to the top of the lobe receptacle stellate.

Guiana; Schomburgh n. 135. Essequibo River collected in 1836. I have only seen Schomburgh's specimen in the Kew Herbarium under this name. Whether the identification is correct or not I cannot say but Mr. Baker has suggested in Syn. Fil. p. 317 that this name is the original of *P. tetragonum*, Sw., which he has united with it in the Flora of Brazil p. 505. Schomburgh's specimen differs from *P. tetragonum*, Sw.

83. *P. tetragonum*, LINN.—*Stipites* erect, few, sub-tufted from a strong, short-creeping epigeous rootstock, 1-2 ft. l., subangular glabrescent or puberulous stramineous. *Fronde*s firm, pellucid, bright clear green, naked or slightly ciliate on ribs and margins 1-1 $\frac{1}{2}$  ft. l., 7-10 in. w., pinnate not reduced at the base. *Pinnæ* apart or distant, 8-10 to a side, spreading often horizontally with a rather larger pinnatifid terminal one, only the lower 1-2 pair shortly narrowed at the base, 4-6 in. l.,  $\frac{1}{2}$ -1 in. w., the barren wider, acuminate with an entire point, within this uniformly lobed to half the depth to the costæ, lobes close, oblique rounded,  $1\frac{1}{2}$ -2 li. w., entire. *Veins* pinnate, about eight to a side, simple 2-4 lower pair united with the branch to the sinus which is often interrupted. *Sori* copious, dorsal, biserial, near the midvein, extending from the base to the apex of the lobes. Pl. Fil. t. 16.

(A.) var. *P. megalodus*.—*Fronde*s much larger; pinnæ 6-9 in. l.,  $1\frac{1}{4}$ - $1\frac{1}{2}$  in. w., lobes  $\frac{1}{4}$  in. w. *P. megalodus*, Schk. Pl. Fil. t. 21.

(B.) var. *Pinnæ* relatively fewer and longer, 6 in. l.  $\frac{3}{4}$  in. w. lobed  $\frac{1}{3}$  deep or more. Colour darkly grey green the under surface microscopically blistered, and costæ and veins densely grey stellate-puberulous. *Sori* with a grey rudimentary involucre.—*Goniopteris quadrangularis*. Fée, Fil. Ant, t. 16. fig. 3.

(C.) var. *Fronde*s much smaller, pinnæ 2 in. l.  $\frac{1}{4}$ - $\frac{1}{3}$  or  $\frac{1}{2}$  in. w. often passing gradually into the pinnatifid apex.

(D.) var. *Fronde*s small, with a terminal rather larger, pinnæ as in the type, lateral ones about  $1\frac{1}{2}$  in. l.  $\frac{1}{2}$  in. w. or less; colour dark, only the basal pair of veins united.

(E.) var. *Stipites* tufted slender, fronds relatively small; pinnæ relatively broad  $1\frac{1}{2}$ -3 in. l.  $\frac{1}{2}$ - $\frac{3}{4}$  in. l. Costæ and ribs ciliate beneath texture thin and very pellucid. Colour light or yellowish green *Sori* often not reaching the base of the inferior pinnæ.

West Indies; very common below 2,000-3,000 ft. altitude growing in grassy and open or half open and little shaded places. The sterile fronds spread

externally on shorter stipites, with fewer broader pinnæ; the much taller fertile erect. (A.) regarded by Mettenius and Grisebach as distinct, only differs by its uniformly much larger size. *Nephrodium brachyodon*, H. K. is often mistaken for this. (C.), (D.) and (E.) are reduced varieties. Fée describes five varieties, which apparently only vary within the limits of what, taking the variation of aspect due as to wide range and other conditions, may be regarded as the type. Rudimentary involucres are detectable in young specimens, more often in some varieties than in others.—South America.

84. *P. Plumieri*, JENM.—*Rootstock* erect, under an inch thick, often 2-3 in. high with descending wiry roots, above clothed with small dark brown scales. *Stipites* cæspitose, erect, 1-1 $\frac{3}{4}$  ft. l., brown rather glossy, naked or slightly puberulous in the channel above, the scales of the rootstock slightly ascending the base. *Fronde*s erect, membranous chartaceous, dark green pellucid, naked and rather glossy on the ribs slightly puberulous on the upper side, tri or pentaphyllous, 1-1 $\frac{1}{2}$  ft. l. and w. *Basal pinnæ* 9-12 in. l., 3-4 in. w., above the lobe which depends from the inferior base, the opposite side narrowed to the base and not lobed, petiole from a  $\frac{1}{4}$ -1 in. l., *central pinnæ* oblong lanceolate not lobed, *terminal*, large oval, acuminate with or without a basal pair of spreading acuminate lobes, *margins* even or sinuate lobate. *Primary veins* costate mostly curved and flexuose  $\frac{1}{3}$ -1 in. apart, areolation fine, some of the meshes including free simple or diverging veinlets. *Sori* very small scattered in part compital, two, often confluent. *Aspidium Plumieri*, Presl.

Guiana; common in rocky forests within the alluvial belt. It is sometimes associated with *Aspidium trifoliatum*, Sw., but the fructification is quite different. The *sori* are very small, copious, two often occurring side by side and becoming confluent and are entirely devoid of any trace of an involucre, in even the very earliest stages. I have never found it more than *pentaphyllous*, but the large plants show a tendency to lobe at the base of the terminal pinnæ.—Brazil.

85. *P. incanum*, SWARTZ.—*Rootstock* wide creeping, as thick as cord, densely coated with subulate dark centred pale ciliate edged scales. *Stipites* scattered, 3-4 in. l., coated with appressed scales. *Fronde*s 3-8 in. l., 1 $\frac{1}{2}$ -2 $\frac{1}{2}$  in. w., elástico-coriaceous, opaque oblong-lanceolate, as broad or broadest at the base; cut nearly or quite to the rachis into horizontal linear-oblong rounded pinnæ, which are  $\frac{3}{4}$ -1 $\frac{1}{4}$  in. l., 2-3 l. br., dilated at the base with a rounded sinus and 1-3 times their own width, between densely coated and gray beneath with appressed unbricating pellate dark centred fimbriate scales, those of the rachis different, upper side sparsely scaly or at length naked and dark-green. *Veins* concealed. *Sori* uniserial nearer the margin protruding through the felt-like vestiture.—Pl. Fil. t. 77. Sl. Herb. p. 56, Eat. Fern. N. Am. pl. 26.

Common on rocks and trees in open situations and forests of light shade, ascending from the lowlands to 5,000 ft. altitude. In dry weather the very elastical fronds involutely curl, and appear as if dead, expanding again with rain. This is the smallest species of the group with scales less acuminate and clearly distinguished by its very wide creeping rootstock which branches and intercrosses freely forming a network on whatever surface it is growing.—West Indies and Guiana, Cuba.

86. *P. thysanolepis*, R. BR.—*Rootstock* creeping, clothed with narrow acuminate pale edged fimbriate scales. *Stipites* erect, usually contiguous 6-9 in. l. with the rachis freely scaly. *Fronde*s 5-8 in. l.

$2\frac{1}{2}$ - $3\frac{1}{2}$  in. w. much the broadest in the lower part. *Pinnæ* spreading 8-12 to a side with a similar terminal one, linear—oblong  $1\frac{1}{4}$ -2 in. l. 3-4 li. br. bluntish mostly contracted and then dilated at the barely confluent bases subdistant subcoriaceous upper surface dark green and slightly scaly, densely felted and grayish with larger pale acuminate fimbriate scales. *Veins* obscure, costal row of areolæ not large with smaller external ones. *Sori* uniserial nearer the midrib, immersed in the scaly vestiture.—*Goniophlebium rhagadiolepis*. Fée, Mem. Fil. t. 19 fig. 3.

Jamaica; frequent on rocky banks at 4,000-5,000 ft. altitude. Common near the Government Cinchona plantations; distinguished by its short broad fronds, few *pinnæ* small copious areolæ and stiffer habit in growth. There is often a line of crustaceous dots around the margins of the *pinnæ* on the upperside. This and the preceding are quite truncate at the base; the two following are not.

87. *P. squamatum*, LINN.—*Rootstock* creeping, densely clothed with fimbriate pale-edged dark very acuminate scales. *Stipites* contiguous, 4-8 in. l., scaly or at length naked. *Fronde* lanceolate-oblong 10-15 in. l.,  $2\frac{1}{2}$ - $\frac{2}{3}$  in. br., usually a little reduced at the base, elastical coriaceous; the under surface densely matted with acuminate dark centred, pale edged and fimbriate scales, the upper slightly so and dark green. *Pinnæ* very numerous spreading nearly horizontally, with their own width or more between them, linear-ligulate  $1\frac{1}{4}$ -2 in. l., 2- $2\frac{1}{2}$  li. b., bluntish or acute, the base equally dilated the lower ones disconnected, the upper confluent by a very narrow margin. *Veins* obscure forming a costal line of areolæ. *Sori* immersed in the felt like vestiture, uniserial medial or nearer the costæ.—Pl. Fil., t. 79.

Jamaica; frequent on rocks, banks and trees, from the lowlands where it is general, through the country up to 5,000 ft. altitude, where it is more abundant. The scales of the *rootstock* have a bright rather reddish tinge when old. The rachis is strong and the scales that clothe it much attenuated, and the fronds have a distinct terminal *pinnæ*. The lower *pinnæ* are  $\frac{1}{4}$ - $\frac{1}{2}$  in. apart. These are often barren, but on the others the *sori* are very abundant reaching from the base to the apex.—West Indies and Mexico, southward to Peru.

88. *P. lepidopteris*, KZE.—*Rootstock* creeping, as thick as a quill, densely coated with narrow fringed scales, having a ferruginous tinge. *Stipites* approximate, 2-6 in. l., scaly. *Fronde*  $\frac{3}{4}$ - $1\frac{1}{2}$  ft. l., 3-4 in. b., gradually tapering to the apex, the base reduced more or less abruptly to mere deltoid small segments, subcoriaceous, and rather elastical freely coated, but most densely beneath with peltate-caudate pale fringed appressed scales. *Pinnæ* very numerous, horizontal linear ligulate acute, 2 in. l.,  $2\frac{1}{2}$  li. b., dilated equally at the base and narrowly confluent, by an open rounded sinus, on the lower one unconnected, with about twice their own width between them, those above the middle somewhat narrowed above the expanded base. *Sori* uniserial nearer the midrib immersed in the felt like coating. *Veins* forming a single line of costal areolæ on each side.

Jamaica; infrequent on rocks, banks and in stony places at 4,000-5,000 ft. altitude. Very near *squamatum* which it closely resembles in shape, but differing in the more flaccid texture while growing; more copious and paler silky vestiture and the form of the dwarfed basal segments. My specimens taper gradually at the apex which terminates in a small lobe, while in all the other species this passage is more or less abrupt into the terminal segment, which in these is much larger. Up to maturity the fronds have a most beautiful silky lunate appearance, when older tawny.—Mexico to Rio Janeiro and Peru.

89. *P. loriceum*, LINN.—*Rootstock* as thick as a quill, firm, wide-creeping or trailing, variegated with appressed scarious and pale margined brown scales. *Stipites* distant brownish naked, 6–12 in. l. *Fronde*s lanceolate ovate-lanceolate or ovate, 1–1½ ft. l., 5–10 in. w., chartaceous, quite naked, brownish green, not or very little reduced at the base with a narrow acuminate sub-entire apex pinnatifid to the narrowly margined rachis. *Pinnæ* numerous, horizontal or subfalcate, the basal ones deflexed or not ligulate acute, acuminate or often attenuated, entire crenate or serrulate, repand, 3–6 in. l., ¼–½ in. w., contiguous, dilated and surcurrent at the fully adnate and barely confluent at the base; sinuses upcurved the lower ones open. *Veins* evident, very pellucid, areolæ in 1–2 rows, the free exterior veinlets thickened at the summit and exterior or not, to the pellucid-edged margins. *Sori* yellowish, 1–2 serial Pl. Fil. t. 78.

Jamaica; most abundant, trailing over the forest floor and on banks and the butts of trees in moist regions from 2,000–6,000 ft. altitude. Variable in the shape of the fronds and pinnæ and in texture, venation and sori, but well distinguished by the very long slender cylindric rootstock the peculiar scales, the pinnæ surcurrent at the base, and the veiny looking surface. Usually it has only a single row of areolæ and sori against the midrib and the margins of the pinnæ are even. The rachis is straw colour in the upper part or throughout. Occasionally a frond is found with the lowest or other pinnæ forked, from which in the pinnatifid state pinnæ are broadened above the base and deeply pinnatifid with numerous linear segments, having exactly the same relation to the type, that the variety *cambricum* does to *P. vulgare*, L.

90. *P. chnoodes*, SPRENG.—*Rootstock* ½ in. thick fleshy creeping densely clothed with blackish hair like attenuated and reticulated scales. *Stipites* apart slender arching ½–1 ft. l., stramineous, and grayish puberulous. *Fronde*s pendent flaccid, ultimately chartaceous pubescent grayish-green 1½–3 ft. l., 5–10 in. w., pinnatifid in the upper part pinnate in the lower. *Pinnæ* 3–6 in. l., ½–¾ in. w., ligulate and generally acuminate horizontal or subfalcate or the lower ones deflexed and recurved, with the inferior side at the base free and auricled, the superior partly or fully adnate the upper ones fully adnate on both sides, slightly dilated or shortly surcurrent, and narrowly confluent, all more or less separated, most so toward the base, margins entire; the rachis slender puberulous, and straw coloured. *Veins* fine areolæ 2–4 serial reaching nearly to the margin. *Sori* 2–4, serial small.

Jamaica; common on trees and banks, in open or shady places from 1,000 to 4,500 ft. altitude. Very distinct, characterized by the fleshy rootstock and fine reticulated scales pendant habit of the fronds, gray vestiture, soft texture copious areolæ and small sori. The pinnæ are mostly opposite and the 1–2 bottom pair little reduced, and narrowed at the base, or the under side.—West Indies, Venezuela and Guiana.

91. *P. attenuatum*, H. B. K.—*Rootstock* creeping the advancing part fleshy ¼–½ in. thick, densely clothed with imbricating ovate acuminate bright brown scales; *Stipites* erect ½ ft. l. naked, dark or light brown, rather glossy. *Fronde*s subcoriaceous naked, brown green glossy, erect ovate-oblong or ovate, ¾–1½ ft. l. ½–¾ ft. w. with a stiff brown glossy rachis and a terminal pinna usually not free and about a dozen oblique lateral ones, which are 4–6 in. l. and ⅓–¾ of an in. w.; straight or curved, narrowed to the base, the lower ones most so, and adnate with an open space between them, acute or acuminate entire.

*Veins* evident the main ones oblique areolæ 2-3 serial. *Sori* 1-2 serial, brown.

Jamaica; very common in the mid-region of the great mountain range, growing in coffee plantations and on way side banks. Generally the pinnæ are narrowed to the base, a little at the top of the frond gradually increasing to much at the bottom, and all are adnate to the rachis. There is, however, a form in which except the two or three upper ones, they are all free and not narrowed but rounded, the lower ones cuneate the lowest of all stipitate and in which the venation is not raised beneath, and the second row of sori is close to the margin. West Indies and Venezuela, Brazil and Peru.

92. *P. nerifolium*, SCHB.—*Rootstock* creeping, often  $\frac{1}{2}$ – $\frac{3}{4}$  in. thick, fleshy in the growing part, densely clothed with bright broadish acuminate scales, having a pale scariosse margin. *Stipites* 1–1 $\frac{1}{2}$  ft. l., strong, brown or castaneous, naked and rather glossy. *Fronde*s subcoriaceous, quite naked, pendent, dull dark green, 2 $\frac{1}{3}$ –3 $\frac{1}{2}$  ft. l., 1–1 $\frac{1}{2}$  ft. w., not or hardly reduced at the base, pinnæ *Pinnæ* sub-distant, spreading rather upcurved in the outer part 8–10 in. l.,  $\frac{1}{4}$  in. w., 12–20 to a side with a similar terminal one, acuminate, the upper ones more or less adnate to the glossy dark brown rachis, those below gradually less so and becoming cuneate, the basal ones stipitate, and almost free; the margins entire or crenate repand. Venation conspicuous, areolæ 4 serial. *Sori* rather large, slightly impressed in 1 or more rows, the inner one always complete.—*Goniophlebium meniscifolium*, Fée.

Jamaica; infrequent among the lower hills on shady banks. Distinguished mainly from the attenuatum by its much larger size, pendent habit and darker colour. The stout rootstock often extends a foot or two long and interlaces lifting from the ground in a large mass. *Goniophlebium intermedium*, Fée., Fil. Ant. t. 18., fig. 3, is apparently this.—West Indies, Mexico to Brazil and Peru.

93. *P. meniscifolium*, L and F.—*Rootstock* stout creeping, paleaceous. *Stipites* 1–2 ft. l., erect naked. *Fronde*s 2–3 ft. l., a foot or more w., subcoriaceous, glabrous, dark olive green, with a long terminal pinna and several spreading similar lateral ones, but all of which are narrowed to the shortly obliquely cuneate base and 6-9 in. l., 1 $\frac{1}{2}$ –2 in. b., acuminate entire, and even or serrate margined. Primary *Veins* costaleform, straight  $\frac{1}{2}$  in. apart, oblique areolæ in 6–8 series. *Sori* serial in all but the exterior areolæ.—Hooker and Baker Syn. Fil. p. 346.

Trinidad; collected by Parker. This I have not seen, but Baker and Hooker suspect its connection with *nerifolium*. Of its allies the latter author says this has longer and narrower pinnæ more membranous, greener fronds, veins and veinlets more elevated and conspicuous, and the sori forming more elevated tubercles on the upper side.—Panama to Brazil.

94. *P. adnatum*, KZE.—*Rootstock* free, creeping, as thick as a quill, clothed with subulate, reticulated, scariosse edged scales. *Stipites* apart, erect, brown and rather glossy, naked or very slightly ciliate, a span to 1 $\frac{1}{2}$  ft. l. *Fronde*s membrano-chartaceous, more or less pubescent, green or lighter beneath 1–2 ft. l.,  $\frac{3}{4}$ –1 $\frac{1}{2}$  ft. w., not reduced at the base, with a free terminal pinna and 4–10, obliquely spreading similar lateral ones, which are 5–10 in. l. and 1 $\frac{1}{2}$  in. w. or more, reduced rather abruptly at both ends, the apex acuminate, the base cuneate or sometimes rounded, and then rather dilated and adnate to the rachis, the lower pinnæ least so, the margins even or

slightly sinuate repend. *Rachis* channelled, slender, pubescent or sub-glabrous. Primary *veins* faintly wavy  $\frac{1}{8}$  in. apart, oblique areolæ 5-7 serial. *Sori* small, occupying usually all but the outer line of meshes.—Hooker and Baker, Syn. Fil., p. 345.

Guiana; common in forest of the interior growing on trees. It varies much in size, texture, degree of pubescence, the shape of the pinnæ especially at their base, and their degree of adnation to the rachis. Some taper from the middle to the base, but more often they are obtusely rounded or cuneate, but in all (except the lowest in the largest fronds) the membrane expands again and is adnate to the rachis. The largest states are the most nearly marked and firmest in texture. The softer more pubescent form is *P. Richardii*, Klotzsch.—New Granada, Ecuador and Guatemala.

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95. *P. fraxinifolium*. JACQ.—*Rootstock* stouter than a quill rather free creeping, densely clothed with spreading or appressed dark reticulated subulate scales. *Stipites* strong, erect, 1-1 $\frac{1}{2}$  ft. l., naked brownish. *Fronds* very coriaceous in texture but pellucid; naked and dark green glossy above, beneath pale and glabrous or puberulous, 1 $\frac{1}{2}$ -2 ft. l., about 1 ft. w., composed of a usually free entire terminal pinna, and a few or several similar spreading distant lateral ones which are 6-9 in. l., 1 $\frac{1}{2}$ -2 in. w., lanceolate-acuminate or cuspidate, tapering or cuneate at the base, sessile and articulated, the upper ones a little adnate. *Veins* slender, areolæ five or six serial, all but the outer line fertile. *Sori* brown, rather large, hardly impressed on the upper side.—Hooker and Baker Syn. Fil. p. 346.

Guiana; common in the forests of the sand stone region growing upon trees, gathered near the Kaieteur Fall. Marked by its coriaceous glossy substance very abundant sori and distant finally articulating pinnæ, which are 3-12 to a side. The thicker texture and free base of the pinnæ distinguish it from *P. adnatum*.—Venezuela, Ecuador, Peru quite across the continent.

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96. *P. surrucuchense*, Hook.—*Rootstock* short creeping, fleshy in the younger part, densely coated with the ovate or lanceolate acuminate reticulated castaneous scales. *Stipites* erect, or suberect naked brownish 6-12 in. l. *Fronds* 9-18 in. l., 6-12 in. w., subcoriaceous pellucid deep green, often with a metallic tinge, beneath quite naked, not reduced, truncate at the base, fully pinnate throughout the rachis rather slender stiff, glossy brownish. *Pinnæ* oblique or the lower ones horizontal  $\frac{1}{2}$ -1 in. apart, nearly or quite opposite, ligulate acuminate and attenuated, 4-7 in. l., 3-5 li. w., 6-12 or more to a side, and a similar long terminal one, which has usually 1-2 pair of short rounded basal lobes; the lower ones unequally subcordate or obliquely rounded at the base, the lowest shortly stipitate, the upper slightly adnate entire or repand in the outer attenuated part. *Veins* pellucid forming a single row on each side of costal areolæ. *Sori* bright aureate, uniserial nearly a line in diameter.—Hook. Icon. t. 69.

Jamaica; infrequent in trees and logs in forests and coffee plantations from 3,000-6,000 ft. altitude, by its vivid deep green clear colour and ruddy sori, this is a most attractive species. In the terminal segment which is rather broader than the lateral an attempt is occasionally shown to form a second row of sori. It is very near *P. remotum*, Baker, of New Grenada and British Guiana which has thinner texture ciliate surfaces repand margins and peculiarly long scales to the rootstock.—West Indies and S. America.

97. *P. remotum*, BAKER.—*Rootstock* fleshy, creeping,  $\frac{1}{2}$  in. or more thick, most densely clothed and shaggy with long reticulated subulate dark glossy scales  $\frac{1}{4}$ – $\frac{1}{2}$  in. l. *Stipites* 9–18 in. l., brown or stramineous, naked. *Fronde* 1– $1\frac{1}{2}$  ft. l., 9 to a foot w., the base thin wiry looking, grass green above, pale beneath very ciliate on both sides. *Pinnæ* linear-acuminate, about 8 to a dozen pairs, erecto-spreading 4–6 or 8 in. l.,  $\frac{1}{4}$ – $\frac{1}{3}$  in. w., the margin even or subsinuate, the apex attenuated, the base cuneate, the lower ones stipitate, the upper slightly adnate,  $\frac{3}{4}$ – $1\frac{1}{2}$  in. apart, terminal pinna usually longer and more distinctly sinuate. *Rachis* slender, edged down the face. *Sori* costal, uniserial. *Veins* pellucid, evident on the surface areolæ—1–2 serial.—Baker in Journ. Bot.

Guiana; rare on trees overhanging the Potaro River, a few miles above the Kaieteur Fall, Jenm., n. 1434. Very closely allied to *surrucucheuse* but more slender, of thinner substance the veins revealed on the surface instead of concealed and covered in the parenchyma, the pinnæ cuneate rather than cordate at the base, the margins in the larger fronds faintly subsinuate and the peculiarly long scales of the caudex.—New Grenada, Kalbreyer, n. 843.

98. *P. aureum*, LINN.—*Rootstock* an inch or less thick, branched and free, creeping, very densely clothed with long soft reddish narrow attenuated scales. *Stipites* scattered, strong, glossy, with a tuft of scales at the base like those of the rootstock 1–2 ft. l. *Fronde* pendent or arched, 2– $3\frac{1}{2}$  ft. l.,  $1\frac{1}{4}$ – $1\frac{3}{4}$  ft. w., cut down to within  $\frac{1}{4}$  in. of the repandly winged, strong, glossy rachis into numerous spreading sub-drooping pinnæ with open rounded sinuses their own width, less or more between and a similar more or less developed terminal pinnæ, chartaceous or subcoriaceous naked, dark or light green. *Pinnæ* ligulate 6–10 in. l.,  $\frac{1}{2}$ – $1\frac{1}{2}$  in. w., gradually tapering outward to the narrow acuminate point, or often contracted just above the dilated base, lowest ones not reduced, repand cartilaginous-edged, entire or with faint broad appressed dentations. *Veins* very slightly raised without stronger primary ones or areolæ copious. *Sori* ruddy in a single or double, usually medial series, sunk, the upper surface more or less distinctly papillose; Pl. Fil. t. s. 76 and 80.

(A.) var. *reductum*. *Fronde*, much smaller but pendent, and conform in colour, pinnæ  $\frac{1}{4}$ – $\frac{1}{2}$  in. w., with an open rounded sinus between; *Venation* rather more prominent; *Sori* copious in a single medial series reaching down to the stramineous rachis, margin not (or very little) repand.

(B.) var. *P. areolatum*, H. K. B.—*Fronde*, smaller stiff, and often erect, surfaces glaucous; *Stipites* and *Rachises* usually dark coloured and polished; pinnæ closer, not contracted near the base  $\frac{1}{4}$ – $\frac{3}{4}$  in. w. *Venation* stronger and more prominent; *Sori* larger, l. serial on simple or united vienlets. Margins less repand.

(C.) var. *P. pulvinatum*, LINK.—*Fronde* large, 2 or more ft. l.,  $1\frac{1}{4}$  ft. or more w. pinnæ closer. Contiguous in the upper part broad acute-pointed  $1\frac{1}{4}$  in. w., surfaces rather glaucose. *Stipites* and *Rachises* dark brown, polished. *Venation* prominent, with stronger



primary veins running to the margins, areolæ often containing free sterile veinlets; *Sori* in two or three series on each side the midrib.

Jamaica; common, at low elevations and among the lower hills and mountains; growing on banks and the stems of palms and branches very high trees where it luxuriates among wild pines. It presents considerable variety in size, width of pinnae, sori, habit, &c.

(A) is a pendent variety large but much smaller than the type, with pinnae only  $\frac{1}{4}$ – $\frac{1}{2}$  inch w.

(B) is very abundant in the mid region of the great mountain range between 2,000–4,000 ft. altitude, growing on trees and decaying logs on way-sides and is much stiffer than any of the rest, being generally erect or suberect, in growth it is peculiarly glaucous. There are reduced states of this hardly larger than one's hand, with few short close pinnae more or less fertile.

(C) approaches the type in size but the pinnae are close and the sori constantly multiseriate. It is found on banks at 2,000–4,000 ft. altitude.—West Indies to Brazil.

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99. *P. decumanum*, WILLD.—*Rootstock* creeping, an inch or more thick, fleshy, densely clothed with long soft linear-subulate reddish or fulvous undulate ciliate-edged scales. *Stipites*  $1\frac{1}{2}$ – $2\frac{1}{2}$  ft. l., strong, naked glossy. *Fronde* chartaceous naked, green on both sides, 2–6 ft. l., 1–2 ft. w., with a long terminal acuminate pinna and many erecto-spreading lateral ones, a foot or more long, and 2– $2\frac{1}{2}$  in. w., the margin even or repand, dentate, decurrent, and connected at the base by a narrow wing to the rachis; sinuses oblique, rounded and open by the narrowing of the base of the pinnae. *Rachis* and costae slender, dark polished. Main veins distinct in parallel lines to the margin, areolæ regular. *Sori* impressed, small multiseriate, occupying all the space between the midrib and the margin.—Hk. & Bk., Syn. Fil., p. 347.

Guiana; frequent on the Berbice and Conge Rivers, growing on the trunk of trees. *Vide* Baker New Ferns, 1874–91, p. 88. This very fine and very distinct plant is distinguished not only by its larger size and green colour from any of the forms of aureum, but by its distinct and regular primary venation as compared to theirs and the more plentiful sori of which there are 4–6 series between the costa and margin, and which are often cretaceous, dotted on the upper side of the fronds.—Guiana, Trinidad to Brazil and Peru.

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100. *P. petrafolium*, JENM.—*Rootstock* strong, short, creeping scaly. *Stipites* few contiguous sub-erect stiff but slender and wiry, 3–8 in. l., dark-brown naked. *Fronde* coriaceous, rigid, naked, or nearly so, greyish brown,  $\frac{1}{2}$ –1 ft. l. 4–6 in. w. deeply pinnatifid; *Rachis* and midribs concealed under the pagina, the wings of the former together about as broad as the pinnae. *Pinna* 6–10 or twelve to a side spreading often unequal 2–3 li. w., 3–6 in l., uniform in width or tapering to a bluntish point dilated and both sur and decurrent at the base, with broad oblique rounded sinuses  $\frac{1}{4}$ – $\frac{1}{2}$  in. w., terminal pinna similar, longer or shorter, not wider like margins even obliquely sinuate. *Veins* immersed, obscure, forming narrow angular areolæ. *Sori* large but interrupted and irregular, uni-serial occupying the whole width from the midrib to the margins.—*Drynaria elastica* Fée, Fil. Ant. t. 20. fig. 2.

Jamaica; rare at 2,000–3,000 ft. altitude growing on decaying logs in coffee plantations, and on trees. Gathered at Murray's Flat, Mount Moses, St. Andrew, where a single plant was found. It is well marked by its narrow rigid pinnae

and relatively large sori. It differs from *P. angustum*, Mett, with which it is united at Kew by the different form of the frond and entire absence of the peltate scales which clothes the surface of that species.

101. *P. crassifolium*, LINN.—*Rootstock* woody short creeping, clothed with lorgish dark brown, ovate—acuminate reticulated scales. *Stipites* strong, erect 2–4 in. l., naked, or with a few deciduous scales below. Castaneous, thickly coriaceous, opaque, naked, glossy, dark green, the underside paler. *Fronde*s simple, erect 2–3 ft. l.,  $2\frac{1}{2}$ –5 in. w., tapering at the base and decurrent on the stipites, the apex usually acute entire cartilaginous-edged. *Rachis* prominent on both sides, light or dark brown, naked or with a few deciduous scales down the back; primary *Veins* oblique 2–3 li. apart not reaching the edge slightly flexuose, areolæ, immersed, many with free included veinlets. *Sori* copious, large, embossed, 1–2 li. diameter in parallel lines reaching from the rachis nearly to the margins, usually confined to the upper half or two-thirds of the frond, the opposite surface pitted and often with dot-like white scales.—Pl. Fil. t. 123–142.

West Indies; common on rocks, banks, and trees in shady or open places up to 6,000 ft. altitude infrequent in the lower regions and abundant in the higher mountains of Jamaica. It is readily distinguishable from the next species by its thicker texture and especially by the single line of large sori between the main veins. The sori compital inserted at the junction of the rachis, not in the veinlets. I have seen a narrow variety 1 in. w. ascribed to Jamaica but am not certain of its authenticity.—West Indies to Brazil and Peru.

102.—*P. phyllitidis*, LINN.—*Rootstock* strong, ligneous, short, creeping, more or less scaly. *Stipites* strong, erect, few or many usually subtufted, and crowded margined and varying from hardly any distinct from the decurrent sides of the fronds to 6 in. l., stramineous, or castaneous, glossy. *Fronde*s stiff, erect, tapering both ways, but more so below, 1–3 ft. l.,  $1\frac{1}{2}$ –3 in. w., generally subcoriaceous naked, glossy, bright pale or dark green entire, the edge thin and cartilaginous, the rachis strong,  $\frac{1}{4}$  gonial below, prominently raised beneath, straw or chestnut coloured, glossy. Primary *veins* raised, distinct, oblique, intermediary, immersed. *Areolæ* 6–12 serial all fertile. *Sori* copious aureo-fulvous, biserial between the main vein, dorsal or terminal superficial.—Pl. Fil. t, 130 and 131, Sl. Herb., p. 41. Eat. Fern. N. Am. pl. 42. *Camphyloneuron*, Presl.

(A.) var. *latum*.—*Fronde*s larger 3–4 ft. l., 3–4 in. w., chartaceous margins repand. *Camphyloneuron latum*, Moore.

West Indies; common on trees, banks and rocks, in open and shady situations, chiefly in the lower regions, but ascending to 3,000, or 4,000 ft. altitude. Very variable in size, &c.; the smaller and larger states seems to run one into the other, differing by the individual conditions of growth. There is a form figured in Plumier t. 131, gathered by Sherring at Jericho, Jamaica, and previously by Purdie, in which the top of the frond is repeatedly branched and divaricated in the form of a stag's horn, another is densely lacerated or pinnatifid along both margins between the primary veins comb-like. A third is coriaceous with ovate-lanceolate fronds rounded at the top, 6–8 in. l., the main vein more prominent and the colour dark. The rootstocks of the typical plants often form large masses of fibre, which, for growing orchids and epiphytal ferns, in suspended baskets or pots is a very durable substance, and an excellent substitute for peat. All the plants of this group are very closely allied.—Jamaica, St. Vincent, Grenada, Trinidad.

103 *P. costale*, KUNZE.—*Rootstock*, short, repent, clothed with small brown scales at the end. *Stipites* erect, usually few, subtufted 2-5 or 6 in. l., brown or stramineous margined; the top marked by a slight dilation of the marginal wing, where it passes into the frond. *Fronde*s coriaceous  $\frac{3}{4}$ -1 $\frac{1}{4}$  or 1 $\frac{1}{2}$  ft. l., 1 $\frac{1}{2}$ -2 $\frac{1}{2}$  in. w., the apex finely acuminate or cuspidate, the base correspondingly tapered, the margins even cartilaginous-edged, thin, slightly repand. The rachis slender, usually stramineous; primary veins slender, immersed, as are also the intermediary. *Sori* minute, dorsal below the clavate summit of the vein, fugacious; *Campyloneuron immersum*, J. Smith Seeman's. Boty. Herald.

Jamaica; frequent on trees overhanging rivers among the hills of the eastern parishes. Well marked from the last by the slender immersed main veins; very small fugacious sori, thicker but quite pellucid texture, relatively longer stipites, and the slight dilation of the wings at the base of the frond. Occasionally furcate.

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104. *P. lavigatum*, CAV.—*Rootstock* slender, free creeping, the bases of the past stipites raised in a single linear series along the upper side, scales dark, ovate-acuminate, reticulated. *Stipites* 2-4 in. l., slender, naked, or with a few deciduous pale reticulated scales, stramineous. *Fronde*s  $\frac{1}{2}$ -1 ft. l.,  $\frac{3}{4}$ -1 $\frac{1}{4}$  in. w., generally finely acuminate, the base attenuated and decurrent on the stipites; chartaceous, naked, light or dark green, glossy; the margins entire, usually repand thin-edged; the rachis slender, stramineous; primary veins slender but slightly raised and distinct, oblique, rather flexuose, *areolæ* immersed. 2-4, serial, containing mostly too free, soriferous veinlets each, the intermediary capillary branch usually absent. *Sori* small, dorsal or terminal, occupying most of the *areolæ*.—Pl. Fil. t. 127.

Jamaica; frequent on wet rocks in river beds, among the lower hills, ascending to 2,000 ft. altitude chiefly in shade. The rootstock is prostrate about as thick as strong cord, dark coloured, reaching a foot or more long. The fronds are borne about a  $\frac{1}{4}$  in. apart in a uniform line and leave at the articulate bases when they fall away, peculiar truncate, socket-like elevations, which are permanent.—West Indies, Guiana, Brazil and Grenada.

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105. *P. repens*, LINN.—*Rootstock*, free or wide-creeping as thick as strong cord or a quill clothed with deciduous dark or pale brown acuminate scales. *Stipites* scattered, deciduously scaly at the base, slender, usually stramineous, 1-6 in. l. *Fronde*s chartaceous, pellucid, glossy, dark or light green, oblong-lanceolate 1-2 ft. l., 1 $\frac{1}{2}$ -2 $\frac{1}{8}$  in. w., shortly tapering at the base, the apex mostly acuminate and often attenuated. *Rachis* stramineous or brown, prominent and rounded beneath, the margins usually uneven and repand, cartilaginous-edged; primary veins distinct on both sides, oblique, flexuose, transverse, branches also slightly raised, *areolæ*, 6-8 serial wider than deep, not divided by an intermediary capillary branch. *Sori* pale, 2 serial between the main veins, terminal or dorsal.—Pl. Fil. t. 134.

Jamaica and Guiana; common in moist forest below 4,000 ft. altitude, creeping and trailing on trees and stems of trees and stones. This is well distinguished from any of the other species by the free or wide-creeping rootstock, the more or less distant fronds, relatively wider apart sori, and primary veins. Generally the margins are sinuate-repand, and the texture thicker than membrano-chartaceous.—Brazil to Peru.

106. *P. angustifolium*. SWARTZ.—*Rootstock* short creeping,  $\frac{1}{4}$  in. thick, more or less clothed with reticulated acuminate scales. *Stipites* numerous crowded,  $1\frac{1}{2}$ –3 in. l., flattish with one to several pair of distinct lateral glands to the narrow decurrent wings. *Fronde*s 1–2 ft. l.,  $\frac{1}{4}$ –1 in. w., curved or subpendent, narrowly acuminate, long, tapering at the base coriaceous, naked, glossy, the underside paler, the margins entire often undulate repand cartilaginous-edged, the rachis stramineous, slender, primary veins hardly stronger than the intermediary, the areolæ directed toward the margin, each containing a single free or anastomosing soriferous veinlet. *Sori* terminal or dorsal, one to each of the larger areolæ.—*P. teniorum*, Willd.

(A) var. *P. amphostemon*, KUNZE.—*Rootstock* more elongated. *Stipites* longer, less crowded and fewer; fronds  $\frac{3}{4}$ –2 in. w., texture less coriaceous, areolæ and sori more copious.—*P. faciale*, Willd.

Jamaica; common on trees and rocks up to 5,000 ft. altitude. Very variable in width; the narrowest form being only two lines wide, with a single series of areola and sori on each side of the rachis, while the broader states have two or three series. The texture is very coriaceous, and the edges are often revolute. The venation is abnormal and intermediate between *Camphyloneuron* and *Goniophlebium*. In narrow forms it quite agrees with the latter sub-genus. A is found on rocks at 6,000 ft. altitude. Its larger state gives it a distinct appearance, but in venation it is quite identical with the type, the broader fronded forms of which imperceptibly pass into it.—Mexico and the West Indies.

107. *P. glaucophyllum*; KZE.—*Rootstock* wide creeping, as thick as stout cord, clothed with deciduous scattered small pellate brown scales. *Stipites* scattered, distant, stramineous, 2–3 in. l., naked, *Fronde*s chartaceous, light or dark green, naked, glossy, lanceolate, entire, cuneate or rounded at the base, the apex acuminate or cuspidate 5–8 in. l., 1–2 in. b., margins thin, even or a little repand. Primary *Veins* costate, 12–2 li. apart, intermediary, forming arches in 5–7 or rarely more series. *Sori* terminal in the areolæ, in one to several parallel (usually several) lines between the stramineous costa and even or little repand margin.—Baker Syn. Fil. p. 340.

Guiana, Cayenne; in the Guiana state of the species the fronds are not glaucous and at the base they are very shortly decurrent on the top of the stipe. *P. semi-pinnatifidum*, Mett; with lobed fronds and larger sori, Mr. Baker makes a variety.—Guadeloupe, Columbia, Ecuador and Brazil.

108. *P. pilloselloides*, LINN.—*Rootstock* very slender, flexuose, wide-creeping, freely branched and forming a net work, clothed with fine pale sub-squarrose acuminate scales. *Stipites* scattered,  $\frac{1}{2}$ –1 $\frac{1}{2}$  in. l., slender, finely fibrillose, scaly. *Fronde*s dimorphous, subcoriaceous, opaque, when dry, dark green, freely clothed with scattered minute pellate caudate scales, which have a brown disc at the base; barren, oblong-lanceolate or ovate-lanceolate, the apex rounded, acute, or acuminate, the base usually caudate, 1–2 in. l.,  $\frac{1}{2}$ – $\frac{3}{4}$  in. b., fertile, linear-lanceolate, 1–2 $\frac{1}{2}$  in. l., 2–3 li. b., margins entire. *Veins* generally obscure, forming a row of large costal areolæ, with free included branches and smaller exterior meshes. *Sori* large, confined

to the costal areolæ. terminal on the included veinlets, bristling with copious long brown hairs.—Pl. Fil. t. 118. *Craspedaria*, Fée. *Lopholepis*, J. Smith.

Jamaica, Dominica, St. Vincent, Trinidad and Guiana; common from the lowlands up to 5,000 ft. altitude, growing on stones, banks, and the stems and branches of trees in open places. The rootstock when divested of its scales is hardly thicker than strong thread. The barren fronds vary considerably in shape. In the largest state they are ovate lanceolate, pointed 2 in. l. on slender petioles nearly as long. In the smallest they are ovate, oblong, rounded,  $\frac{1}{2}$  in. l., the stipites only 1–2 li. l. Generally the barren and fertile fronds are distinct in form but not uniformly. In *P. ciliatum* Willd., the fertile fronds are linear and so narrow that the two lines of the sori touch on the inside and project on the outside over the margins, giving a moniliform aspect to the margins.—West Indies and South American Tropics.

109. *P. vacciniifolium*, FISCH and LANG.—*Rootstock* as thick as strong cord, wide, creeping and freely branched, very densely clothed with long fibrillose fine reddish scales which eventually become pale. *Fronds* scattered, copious, coriaceous, glabrous, bright green, glossy on the upper side, sub-sessile or very shortly petioled dimorphous; the barren, oblong, rounded at the top, the base cuneate,  $\frac{1}{2}$ – $1\frac{1}{2}$  in. l.,  $\frac{1}{4}$ – $\frac{1}{2}$  in. w., the fertile linear, 1– $4\frac{1}{2}$  in. l.,  $1\frac{1}{2}$ – $2\frac{1}{2}$  li. b., the margins even. *Veins* immersed costal areolæ large, each containing a free veinlet exterior meshes smaller. *Sori* copious in long medial lines, the sporangia mixed with reddish fibrillæ.—*Lopholepis*; J. Smith.

Jamaica; spreading abundantly over the branches and trunks of trees usually at low elevations. This has a stouter more densely clothed and wider diffused rootstock than any of the other species of the group. In a barren state the fronds resemble those of the next species but are smaller. In this condition the different venation is a reliable distinguishing character. It presents however nearly at all times the two kinds of fronds, when the rush-like fertile ones are so distinct as to distinguish it at sight. I have only seen Jamaica specimens in the Kew Herbarium, collected by Bancroft.—Common at sea level in Trinidad.

110. *P. lycopodioides*, LINN. —*Rootstock* cord-like, wide, creeping, branched and forming a copious net work, densely coated with fine appressed scales, which are pale at first, but ultimately dark. *Fronds* coriaceous, naked, a bright glossy green, scattered with hardly any or very short distinct petioles, 4–7 in. l.,  $\frac{1}{3}$ – $\frac{3}{4}$  in. w., oblong or linear-lanceolate, acute or acuminate at the apex, the base tapering and decurrent on the short stipites, barren ones shorter and broader than the fertile; margins entire. Primary *veins* more or less distinct but evanescent before reaching the margins, fertile areolæ medial with included free or united branches, and smaller and exterior meshes. *Sori* sunk, the opposite surface papillose, medial or nearer the margins, terminal on a single or two or more united enclosed veinlets.

(A.) var. *P. salicifolium*, WILLD.—*Fronds* usually rather narrower, the sterile and fertile conform or less distinct.

Jamaica; abundant on low elevations but attaining 5,000 ft. altitude spreading over the trunks and branches of trees, and on rocks and banks chiefly in exposed places, but also in loose forests. Variable in size and usually smaller at the higher elevations. In the type the barren and fertile fronds are generally distinct, and difform in shape, but casually both forms are fertile. In drying it turns nearly black. The conform barren, and fertile fronds of A, led, Willdenow, Grisebach and other writers, to regard it as a distinct species.—General through the West Indies to Brazil and Peru.

111. *P. chinabowensis*, JENM.—*Rootstock* thick as moderately slender cord, wide or free creeping, often flexuose, clothed at first with ovate acuminate pale, fuscous scales; *Stipites* scattered  $\frac{1}{4}$ – $\frac{1}{2}$  in. l. *Fronde*s chartaceous, pellucid venulose on both sides, when dry, naked, fuscous green, the underside paler 4–6 in. l.,  $\frac{3}{4}$ –1 in. w., tapering shortly to the base and much longer outwards to the acuminate part. *Margins* even or slightly repand. *Veins*, meshes angular, 3 serial, the outer smallest and with free exterior branches not reaching the edge. *Sori* medial, uniserial, circular 1 li. w., terminal on a single pair of connivent included. *Veinlets* in the larger central areolæ.—Jenm. in Demerara Argosy, 1882.

Guiana; Jenman n. 1441 and 2151 forest near Chinabowa, Potaro River and near Mt. Raywa and elsewhere, growing on trees and stones. Differs from *P. lycopodioides* by its conform fertile and barren fronds, thinner texture, peculiar pale colour, veiny aspect, due to the conspicuous venation and thinner more freely rooted rhizome clothed with different scales.—Endemic.

112. *P. Swartzii*, BAKER.—*Rootstock* slender, wide creeping branched, clothed with fine linear acuminate fulvous scales, which in time become dark. *Fronde*s scattered, chartaceous or membrano-chartaceous, pellucid, naked, or some times stipitate, or more distinctly petioled, 3–6 in. l.,  $\frac{1}{4}$ – $\frac{1}{2}$  in. w., tapering both ways, the apex acuminate or bluntish, the base decurrent on the slender stipites, the margins subentire or sinuate rarely deeply lobate. *Veins* fine but evident, *areolæ*, 1–3 serial, fertile, meshes enlarged, usually central with included free or united branches, marginal branches also free or united. *Sori* medial slightly depressed terminal on a single or two or three united veinlets.—Pl. Fil. t. 121–2. *P. serpens*, Swartz.

Jamaica; common in the limestone districts up to 2,000 ft. altitude on rocks and trees. Variable in size, texture and venation and the more or less uneven margins. In some cases the fronds are irregularly lobate. The venation is equally variable, and in instances resembles that of *Goniophlebium* the costal series of narrow barren areolæ being absent. The rootstock too, is very distinct and peculiar. It is shrivelled, striated, longitudinally, and the branches are usually as shown fancifully in Plumier's first figure short or rudimentary, mixed with the scales, at intervals a small acuminate dark spur-like appendages *P. runcinatum*, Desv. is represented in Plumier's, figure quoted above.—*P. serpens*, Swartz, Hk. Sp. 5 p. 35, (non Forster.) *Anapeltis* J. Smith.

113. *P. persicariæfolium*, SCHRAD.—*Rootstock* cord like, wide creeping ascending, densely clothed with appressed tawny castaneous linear subulate scales. *Stipites* scattered  $\frac{1}{4}$ – $\frac{3}{4}$  in. l. *Fronde*s lanceolate, elastical chartaceous, very pellucid, naked, light green, 6–9 in. l., 1–2 in. b., the base cuneate, the apex acuminate. Main veins distinct, two-thirds to the margin where there are evanescent, forming large areolæ with copious small included and exterior meshes, the transverse costal ones narrow and linear, and numerous, free branches along the even or little repand margins. *Sori* medial linear or linear oblong oblique with the costa, 1–4 li. l., attached to a slightly elevated linear receptacle formed on the common union of several vein meshes in the centre of the large series.—Hooker and Baker Syn. Fil. p. 358. *Microgramme*, Presl.

Guiana; Trinidad; very common on trees in forests and by the sides of the rivers and rocks of the lower elevations. The elongated sori directed obliquely toward the margin and special linear receptacles mark this as a very characteristic species. Spencer gathered it 14 in. long.—Ecuador, Venezuela, and Brazil.

114. *P. Thurnii*, BAKER.--*Rootstock* wide-creeping, cord like densely clothed with castaneous, appressed linear-subulate scales. *Fronde*s lanceolate scattered, 1-3 in. apart, chartaceous pellucid, dark green, glabrous, 6-9 in. l., 1-1½ in. w., the apex very acuminate and tapering correspondingly to the base of the stipe; *Margins* usually even. *Veins* fine with no distinct main branches, forming three series of angular meshes, the central length with free or uniting branches along the outer series which do not reach the edge. *Sori* medial usual at the conniving ends of two included veinlets, but sometimes of one prominent circular. 1-1½ li. w., receptacle small scaly.--Jenm. in Demerara Argosy, 1883.

Guiana; Jenman n. 1,590 and 2,125. Pomeroon River on bushes by the river side; Essequibo River, in forests near Bartica Grove. In size, texture and general aspect this resembles *persicariaefolium* for which it is usually mistaken, but it differs in the large perfectly and constantly round sori, and large open meshes in which they are contained. The stipites appear about ½ in. l., but they are margined nearly or quite to the base by the decurrent sides of the frond.—Endemic.

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115. *P. percussum*, CAV.—*Rootstock* slender, cord-like but firm and stiffish, free-creeping clothed with two kinds of scales; one appressed, pellate attached by dark nucleus, the other subulate, reticulate, spreading. *Stipites* thinly clothed with appressed scales or at length naked 1-3 in. l. *Fronde*s scattered, very coriaceous opaque; upper surface dark green, naked, under paler and sprinkled with minute pellate pale fringed scales ½-1 ft. long, ¾-1¼ ft. in w. tapering at both ends above to a sharp attenuated point. *Margins* even, more or less undulate-repand when dry. *Veins* evident above, obscure beneath, forming a fine copious reticulation uniform without primary branches. *Sori* round, medial, uniserial impressed on the upper side; receptacles punctiform, bearing a cushion of dense short scales, among which the sporangia are mixed.—Hook and Baker, Syn. Fil., p. 356. Hook Fil. Exot. t. 59. Pleopeltis Hook and Grev. Icones.

Guiana; very abundant all through the alluvial forest region on trees. This is allied to *lanceolatum* but the fronds are not so stiff though very leathery, the upper surface not scaly and firm venation, with less evident primary branches. It has similar raised cushion-like pads for the sori, brown or black, but they are mostly circular and much smaller with abundant open space between them, and the mid rib and margin.—Columbia and Brazil.—(Naturalized in Trinidad, Ed).

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116. *P. lanceolatum*, LINN.—*Rootstock* slender, free creeping, clothed with narrow pale margined scales. *Stipites* scattered 2-4 in. l., slender, dark-brown, naked or with a few deciduous pellate scales, margined above. *Fronde*s stiff, very coriaceous, more or less freely coated with minute dark-centered pellate, fimbriate-edged appressed scales, beneath which they are a dark brownish green; lanceolate or linear-lanceolate, 4-12 in. l., ½-1¼ in. b., tapering freely at both ends; margins entire or sinuate. *Rachis* dark-coloured beneath. *Veins* immersed copiously reticulated forming large costal areolæ, with included and exterior smaller meshes. *Sori* large 2-3 li. b., medial oval or oblong, rarely round depressed contained in the larger

areolæ, sporangia mixed with short dense scales which form permanent pads.—*P. lepidotum*, Willd. *P. ensifolia*, Hook. Fl. Exot. t. 62.

(A.) var. *Elizabethæ*, JENMAN.—*Fronde*s uniformly lobed on both sides.

Jamaica; common from 2,500–6,000 ft. altitude in exposed situations on rocks, banks and trees. A very distinct plant. In narrow fronds the large sori occupy the whole space between the midrib and margins. In the irregularly lobed states there is often a partial second row and the short lobes have sometimes a double series. In many cases it is confined to the upper half of the frond. The upper surface is usually pitted with elliptical depressions on the sori. (A) is found in the region of the Government Cinchona plantations, Mexico, and the West Indies to Brazil.

117. *P. megalophyllum*, DESV.—*Rootstock*  $\frac{1}{2}$ –1 in. thick, densely clothed with pellate ovate acuminate pale margined scales, wide creeping. *Stipites* scattered 1–2 in. l., strong brown. *Fronde*s coriaceous, paler beneath than above, naked,  $\frac{1}{2}$ –1 $\frac{1}{2}$  ft. l., 1 $\frac{1}{2}$ –2 in. w., oblong lanceolate acuminate or cuspidate—decurent at the base; margins entire. *Rachis* prominent beneath. *Veins* copiously areolated, the primary ones only slightly stronger and parallel. *Sori* on the anastomosis of several veins, large round oval or oblong in a single row on each side, nearer the costa than margin *Receptacles* superficial or elevated *P. Schomburgkianum*, Kze.—Hooker and Baker Syn. Fil. p. 355.

Guiana; *Schomburgh* n. 992. Peculiar for its large fronds and extraordinary thick wide creeping rhizome the scales of which latter vary from linear-acuminate to lanceolate-ovate acuminate. The sori are 1 $\frac{1}{2}$ –2 li. in diameter.—Brazil.

### ADDENDA.

Of the following species two have been described by Maxon in Jamaica Bulletin, 1904, and *Polypodium Harrisii*, is described by Jenman in Gard. Chron., 1900.

Reference to Nos. 29 and 49 of Jenman's numbers will show how he placed them in his manuscript—but it is probable the newer nomenclature will prevail.—[ED.]

*Polypodium rigens*, MAXON.—*Plant* 15–28 c.m. high with 10–15 slender rigid fronds. *Rhizome* about 4 m.m. thick elongate, short creeping or ascending, the grayish inconspicuous chaff noticeably iridescent under a lens, narrow, long acuminate. *Stipes* 2–4. 5 c.m. long rigid for the most part closely set, dark brownish, thickly covered with long spreading bright brown hairs. *Laminae* 13–23. 5 c.m. long, 1–2 c.m. broad, linear or linear-lanceolate, tapering from near the middle to both apex and base, erect but usually arcuate toward the apex, dark green above, conspicuously lighter on the under surface, coriaceous, opaque, cut to the blackish rachis into 45–60 pairs of alternate approximate pinnae. *Pinnae* exactly oblong, regularly rounded at the apices, the largest (near the middle of the lamina) 10 m.m. by 3.5 m.m. decreasing in size very gradually above to give rise to a terminal cauda which is crenate and finally entire, decreasing rather more abruptly below, the lowermost pinnae minute (2 m.m.) slightly more distant, more or less subopposite and dilated upon the upper side; the upper two-thirds of the lamina soriferous the sori



borne midway to the margins (4-6 pairs to each pinna) on the obscure free simple veins, the sporangia mixed with a few bright brown hairs, similar hairs borne rather abundantly on both sides of the rachis but sparingly along the midveins and sterile veins on the under surface; the sori at length nearly or quite confluent, covering the surface of the pinna from base nearly to apex and against the revolute margins.

Type in the United States National Herbarium, No. 427,566, collected from trees on the heavily wooded upper slopes of John Crow Peak, Jamaica, altitude 1,650-1,800 meters, by William R. Maxon, No. 1,346, April 18, 1903. The type sheet comprises two plants and several detached fronds, all of which are perfectly characteristic of the species as represented by the following specimens, all from Jamaica.

Highest slopes of John Crow Peak, altitude 1,650-1,800 meters, *Underwood* Nos. 806, 2,456a. Maxon No. 1,294.

Base of John Crow Peak, altitude 1,500-1,650 meters, *Underwood* No. 2,387. Maxon No. 1,269.

New Haven Gap, altitude 1,650 meters, *Underwood* Nos. 973, 1,083, 1,084, Clute No. III.

Morce's Gap, altitude 1,500 meters, *Underwood* Nos. 509, 643, W. Harris No. 7,127.

Blue Mountain Peak, W. Harris No. 7,487. *Cinchona*, altitude 1,500 meters, *Underwood* No. 2,626.

Specimens of this plant were referred by Jenman to *Polypodium rigescens*. Bory described from the island of Bourbon. From that species, however, *P. rigens* differs markedly in several characters upon which Willdenow laid stress in his original description of the latter species, and which were further brought out by Hooker and Greville upon the occasion of their figuring an authentic specimen. It is distinguished by the hispid-pilose covering of its vascular parts (*P. rigescens* is described and figured as glabrous throughout), by its greater size and relatively greater breadth, and by the oblong rather than ovate-oblong shape of the pinnae. In these differences the Jamaican plants are perfectly constant. The species is apparently not rare in Jamaica. Jenman's remark upon its habitat and distribution are of interest:—"Frequent on the branches of trees above 5,000 feet altitude; among the most rigid of all this miscellaneous group of species, uniformly found growing on the branches of trees of the high ridges to which the distribution is confined, not on the trunks as most of the other similar species do." (Maxon, *Jam. Bull.* 1904. Ed.)

*Polypodium aromaticum*, MAXON.—Plant rigid 15-20 c.m. high. *Rhizome* stout, suberect, considerably elongated, with abundant dark-brown lanceolate attenuate chaff, and bearing numerous closely set fronds imbricated much after the manner of *Elaphoglossum huacsauro*. *Stipes* averaging 3 c.m. long dull-brownish, hispid by scattering short spinescent hairs from their fragility early impart a tuberculate appearance. *Laminae* pinnate about 13-17 c.m. long, at most 4 c.m. broad, erect coriaceous, opaque, narrowly oblan-ceolate giving rise rather abruptly to a terminal caudate segment 2-3 c.m. long which is subentire except at the coarsely serrate bases. *Rachis* hispid on both surfaces throughout similarly to the stipe. *Pinnae* about 35 pairs, distinctly alternate, linear, strongly revolute, 2-2.5 m.m. broad nearly or quite their width apart, entire falcate, fully aduate to the blackish rachis, dilated at the upper side, the apices acute; the lower pinna gradually reduced, the lowermost not minute, 5-7 m.m. long, extremely brittle; venation free, the distinctly black mid veins bearing 8-13 pairs of obscure simple oblique veins which approach

the margin. *Sori* 6-12 pairs to the pinna, borne at half the distance to the margin.

Type in the herbarium of the New York Botanical Gardens collected on the Blue Mountain Peak, Jamaica, at an altitude of 1,950-2,225 meters by L. M. Underwood, No. 1,449, February 11-12, 1903. There is a fragment of the type specimen in the U. S. National Herbarium, No. 428,420. Other specimens to be referred to this species are *Underwood No. 1,469* and *Underwood No. 2,490* both from the summit of Blue Mountain Peak, and Maxon No. 1,346a from the highest slopes of John Crow Peak, altitude 1,650-1,800 meters. There is additionally a single sheet in Jenman herbarium.

Jamaican specimens of this species were referred by Jenman to *Polypodium firmum* Klotzsch founded upon material from Chili and Guiana. They accord only indifferently with Klotzsch's description; and in any event the earlier *Polypodium firmum* of Kaulfuss applied to a very different plant from Australia, precludes use of the name. There is a specimen in the U.S. National Herbarium No. 200,659, collected at Songo, Bolivia, November, 1890, by Miguel Bang No. 901 (distributed as *P. plumula*), which is identical with the Jamaican plants here described as *P. aromaticum*; and it has moreover, after a lapse of more than ten years the peculiar aromatic odour noted in these. It may indicate a general distribution of *P. aromaticum* in South America; but whether or not it represents the *P. firmum* of Klotzsch is difficult to say. The name *Polypodium aromaticum* is founded upon Jamaican specimens and is not intended as a substitute for *P. firmum* Klotzsch. If the plants described by Klotzsch under the latter name shall prove distinct from *P. aromaticum*, they must necessarily receive a new name.

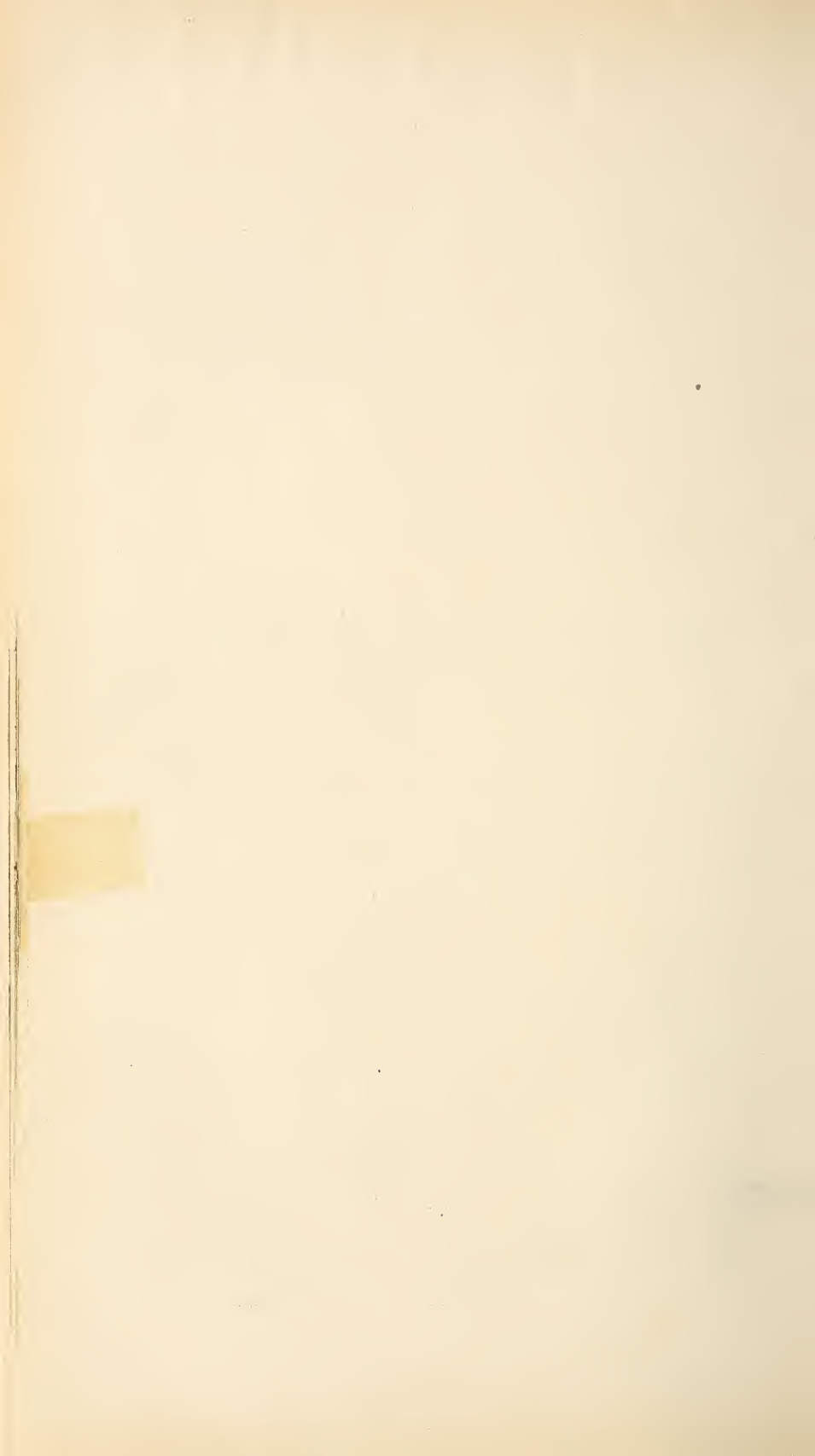
*Polypodium aromaticum* may be distinguished easily from *P. rigens* by its broader laminae, by its fewer pinnae (these linear and acute-pointed), by the absence of bristly hairs among the sporangia, and in recent specimens at least by the remarkable spicy odour of the fronds. The type specimen bears about 20 fronds. According to Jenman the species is "infrequent on the branches of trees above reach from the ground at 6,000 to 7,000 feet altitude in forests.—(Maxon in *Jamaica Bulletin*, August, 1904.)

*Polypodium Harrisii*, JENM. n. sp.—*Rootstock* repent, fleshy,  $\frac{1}{2}$  to  $1\frac{1}{2}$  inch long, very densely clothed with pale fulvous, acuminate, linear-lanceolate, reticulated, wavy scales. *Stipites* mostly clustered, wiry, freely clothed with rusty, spreading, fine hairs, 2 to 4 inches long. *Fronds* ligulate, 5 to 10 inches long,  $\frac{1}{4}$  to  $\frac{5}{8}$  inch wide, merely sinuate or uniformly shallowly lobate, the lobes broadly rounded base and apex plain and tapering, the latter usually blunt; margins densely hairy, other parts glabrous and glossy; substance coriaceous and brittle; midrib and veins on both sides covered in the parenchyma; surface wrinkled and striated more especially the upper. *Veins* in groups, the lateral branches connected forming two to three series of meshes of varying shape and form, the outer short veinlets sometimes free. *Sori* oval or round, copious, in two series mostly, sometimes in part three, on each side, one to each mesh, on a shorter or longer spur arising from the middle of the arch, generally medial but occasionally terminal; sunk in pits which are not raised on the upper side of the fronds. Near Mabess River, Jamaica, 3,000 feet altitude—*Jamaica Bulletin*, February 1903.

This highly interesting species comes in between *Polypodium trifurcatum* and *Enterosora Campbelli*, all three having a very close resemblance and evident connection. In all, the sori are more or less sunk, but extrude when mature. In this and *P. trifurcatum*, they are in oval or round pits, while in *Enterosora* they are immersed in slit-like linear apertures and are much longer, but extrude eventually. In both this and *Enterosora* the venation is

connected, forming a series of two or three meshes on each side of the midrib, while in *P. trifurcatum* the branches are uniformly entirely free. The venation quite conforms to some of the states of *Phymatodes*, the costal series being narrow and unoccupied by either free branches or sori. Mr. Wm. Harris, F.L.S., the Superintendent of the Hill Gardens, the discoverer of it, whose name it bears, writes me that : It is almost as rare as *Enterosora*, and like that plant, it grows on the high limbs of large forest trees, so that it is a difficult matter to detect it from the ground, and when detected, it is an exceedingly difficult matter to get within reach of it. Possibly this exalted elevation on large trees almost beyond reach of sight, may be the reason, more than their rareness, of the late discovery of *Enterosora* in Jamaica.





TRIBE XII.—GRAMMITIDÆ.

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*Sori* arcuate, oblong, linear-oblong, or linear, short or more or less elongated and continuous, situated on the veins, which form the receptacles, and disposed variously in simple forked, or confluent and reticulated lines; superficial or immersed, quite destitute of involucre. *Sporangia* stalked, compressed arched by an incomplete vertical pointed band, splitting transversely at maturity. *Fronds* from less than an inch, to several feet long, entire or variously cut and often multifid. *Venation* simple or forked, or free, united or copiously reticulated.

The plants of this tribe form a moderately limited group representing one fairly extensive genus, and five very small ones, which are loosely connected by the single tribal character of naked elongated sori. The large majority inhabit regions within the tropics of both Hemispheres, only a few extending beyond, chiefly in the South temperate zone.

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*Sori* transversely oblong or arcuate; fronds pinnate, primary costate, the transverse arcuate.

1. *Meniscium*.

*Sori* oblong, linear-oblong or linear; fronds simple or compound, veins free.

2. *Gymnogramma*.

*Sori* linear-oblong immersed in the parenchyma, fronds simple, veins united.

3. *Enterosora*.

*Sori* reticulated, fronds palmate or pinnate.

4. *Hemionitis*.

*Sori* sparingly diffused over the slender surface, fronds simple, veins reticulated.

5. *Anetium*.

*Sori* reticulated or zigzag in oblong angular meshes, fronds simple, veins areolate.

6. *Antrophyum*.

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GENUS XXXI.—MENISCIUM, Schreb.

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*Sori* oblong, curved, dorsal on the arc of the united transverse veinlets. Primary veins costate, raised, pinnatifid, connected by opposite united curved or angled branches, which form multiseriate narrow transverse areolæ containing each a free or attached erect venule. *Fronds* rarely simple, chiefly pinnate.

All the species of this genus, within the Geographical scope of this flora are pinnate. The sori though strictly confined to the transverse veins, become ultimately confluent, partly or quite concealing the under surface of the fronds. The outer fronds are generally barren and the inner fertile, the united veinlets in the former are angled while in the latter they are arcuate. Generally the species are well defined, and they vary only in size and form. They are terrestrial plants preferring moist or wet situations. About twenty species are known.

Fronds dimorphous, the pinnae of the fertile reduced, and the sori covering nearly the whole surface.

1. *M. angustifolium*.
2. *M. macrophyllum*.

Fertile fronds not much modified in size of pinnae, and sori not generally confluent.

3. *M. Kapplerianum*.
4. *M. serratum*.
5. *M. reticulatum*.

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1. *M. angustifolium*, WILL.—*Rootstock* fasciculate decumbent, short-creeping forming with the abundant rootlets matted masses. *Stipites* contiguous or subtufed, 10–15 in. l., strong, slightly pubescent, dark coloured below and clothed with a few deciduous scales. *Fronds* pinnate 1–1½ ft. l., 5–10 or 12 in. w., barren and fertile distinct, sub-coriaceous naked, except the costae which are puberulose, dark green, composed of numerous lateral pinnae and a similar terminal one. *Rachis* light coloured, channelled, finely pubescent. *Pinnae* spreading or erecto-spreading approximate but not close, linear lanceolate tapering and very acuminate, the base cuneate and stipitate, 3–6 in. l.,  $\frac{3}{8}$ – $\frac{5}{8}$  in. w., lowest pair usually a little reduced, margin entire. *Sori* copious, confluent, and covering the under surface at maturity. *Veins* close areolae 6–8 serial. *Sl. Hist.* p. 84 t., 49, p. 86. *Herb.* p. 86, *M. sorbifolium*, Eat., *Phegopteris*, Mett.

Jamaica; common on wet rocks in the beds of rivers among the lower hills and widely diffused through the Colony. This is the smallest of the West Indian species, with narrow willow-like leaflets the fertile fronds smaller than the barren with narrower pinnae on rather longer stipites. The plants are often submerged by the rising of the rivers in wet weather and the matted roots are developed to hold their positions in the heavy drag of the rushing water on such occasions.—Cuba to Central and South America.

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2. *M. macrophyllum*, KZE.—*Rootstock* stout, decumbent, short, creeping, dull, rugose, scaly. *Stipites* strong, erect, approximate 1–2 ft. l., slightly furfuraceous, scaly at the base finely pubescent above, channelled. Barren and fertile *fronds* distinct, the former 1½–2½ ft. l., 1–1¾ ft. w., subcoriaceous or chartaceous, light or dark green rachis and under surface glabrous or freely pubescent with 5–10 pair of spreading lateral pinnae and a similar terminal one, 8–10 in. l., 1½–2 in. w., oblong-lanceolate, acuminate the margins entire, the base rounded, of the upper ones obliquely, the inferior substipitate. *Veins* evident, areolae 15 or more deep. Fertile *fronds* taller with distinct much smaller pinnae venules arising from the arc connected or disconnected. *Sori* copious often confluent and concealing the surface.—Hook. Sp. Fil. Vol. 5, p. 166.

Guiana: frequent in forests throughout the alluvial region. Distinguished from *reticulatum* by the much fewer generally larger and different shaped pinnae and dimorphous fronds. There are two forms, one slightly ciliate and the other larger, quite glabrous. *Acrostichum (Gymnopteris) Fendleri*, Baker, found in Trinidad and Guiana is nearly allied to, if not a form of this.—Brazil.

3. *M. Kapplerianum*, FÉE.—*Rootstock* strong, prostrate, repent. *Stipites* approximate, erect, slightly scaly at the base, above glabrous, stramineous or brown, 1–2½ ft. l. *Fronde*s chartaceous, naked or slightly pubescent, light green, 1½–2½ ft. l., 8–10 or 12 in. w. *Pinnæ* spreading, contiguous or sub-distant, the lowest pair as large as any and a similar but often broader terminal one, 6–8 in. l., ¾ in. w., ligulate, lanceolate, acuminate, the base rounded, the lowest pair cuneate, nearly sessile, margins even or subcrenate. *Rachis* and costæ rather slender, brown or stramineous, naked or pubescent. *Venation* inconspicuous but obvious on the surface, areolæ in several series. *Sori* close but not confluent *sporangia* mixed with hairs.—Fée. Gen. p. 223, *M. sorbifolium*.

Guiana; Appun. nos. 1469 and 1058; Hostmann, Kuppler, Le Prieur. Wet places on the banks of the Demerara river. This is rather a slender species intermediate in character between *angustifolium* and *serratum*, with both kinds of fronds much alike, and the sori not confluent though close together.—Brazil.

4. *M. serratum*, CAV.—*Rootstock* strong decumbent, short-creeping. *Stipites* contiguous, erect, 2–3 ft. l., channelled naked, dark coloured, at the base, pale above. *Fronde*s chartaceous, naked or slightly ciliate on the ribs and veins beneath, dark green, paler beneath, 2–4 ft. l., ¾–1¼ ft. w., with a distinct terminal pinna and numerous more or less distant spreading or erecto-spreading lateral ones, which are 4–9 in. l., ¾–1½ in. w., acuminate, the base rounded or cuneate and stipitate serrate or crenate serrate margined. *Rachis* and costæ stramineous, the former puberulous on the face. *Venation* conspicuous on both sides areolæ narrow, numerous. *Sori* sparse becoming confluent and diffused over the surface.

Jamaica; common in swampy ground at low elevations; most plentiful in the Western parishes, more or less aquatic. A taller plant usually than *reticulatum* with more slender stems and narrower pinnae with uniformly serrated margins. The latter is its most reliable character. The pinnae often produce buds in the axils. The sori are less copious in *sporangia* than in any of the other species; and it has a reddish tinge.—Trinidad and Tropical America.

5. *M. reticulatum*, SWARTZ.—*Rootstock* stout, decumbent, short-creeping. *Stipites* tufted strong, erect, 1½–3 ft. l., naked, brown or pale, coloured. *Fronde*s 1½–3 ft. l., 1–1½ ft. w., oblong-lanceolate, sub-coriaceous, naked, or puberulous beneath and paler than above. *Rachis*, strong, naked, light or dark brown. *Pinnæ* numerous, spreading, 2–3 in. apart, oblique, the lower ones largest, gradually reduced upwards, to the similar free terminal one, the former 5–10 in. l., 1–2¼ in. w., broadest at the base, which is rounded, stipitate or sessile, thence tapering outwards to the acuminate point, margins entire, or slightly crenate. *Venation* conspicuous, areolæ very numerous. *Sori* copious, confluent or nearly so. Pl. Fil. t. 110, *Polypodium*, Linn.

Jamaica; common in moist open or little shaded situations at low elevations. A strong robust species, with about 10–15 pinnae to a side which are generally large, and broad at the base, from whence they taper outwards to the acuminate point. The fertile fronds are taller and on longer stipites than the sterile.—West Indies to Peru and Brazil, Mexico.

## GENUS XXXII.—GYMNOGRAMMA.—Desv.

*Sori* oblong, linear oblong or linear, situated on the back of veins superficial or somewhat immersed. *Veins* free or united. *Fronde*s ranging from simple to decompose, naked ciliate, or coated beneath with white or yellow powder.

This is a genus of considerable extent, in which very dissimilar plants are associated by the common character of superficial or immersed naked, elongated sori. In the form and arrangement of the sori it resembles *Asplenium* of which in this division it may be regarded as the analogue, differing by the absence of involucre. The farinose section is remarkable for a fecundity, equalled by very few other plants in the family. The species are about equally divided between the old and the new world, and are chiefly tropical. They occupy banks and usually open generally fully exposed situations, and are represented abundantly from the lowest to the highest elevations.

Frondes not coated with powder.

Frondes simple.

1. *G. cyclophylla*.
2. *G. elaphoglossoides*.

Frondes flabellate digitate.

3. *G. pumila*.

Frondes simply pinnate.

4. *G. rufa*.

Frondes bi-pinnatifid.

5. *G. gracilis*.
6. *G. consimilis*.
7. *G. deplazioides*.
8. *G. charophylla*.
9. *G. Schomburghiana*.
10. *R. hirta*.
11. *G. flexuosa*.
12. *G. schizophylla*.

Frondes coated with powder beneath.

Pinna trifoliolate.

13. *G. trifoliata*.

Frondes decompose.

14. *G. tartarea*.
15. *G. triangulata*.
16. *G. calomelanos*.
17. *G. sulfurea*.

1. *G. cyclophylla*, BAKER.—*Stipites* densely tufted, stiff and very wiry, numerous 5–7 in. l., chestnut brown below, pale at the top, rounded beneath and flat on the face. *Fronde*s suborbicular, rounded, the base sub-cuneate  $\frac{1}{2}$ – $\frac{3}{4}$  in. in diameter each way, naked, pale yellowish green, glossy, thick and coriaceous, but pellucid; margin revolute, quite even. *Veins* flabellate, completely immersed,



2 or 3 times forked, more evident on the upper side. *Sori* oblong, terminal on the veins partly concealed under the revolute margin. Baker in Trans. Linn. Soc. ser. 2, Bot. Vol. II, p. 293, pl. 53.

Guiana; im. Thurn No. 295 tops of Roraima. This is a singular species, the affinity of which is with *G. reniformis*, Mett. The stipites are densely tufted, a span long, the fronds not much larger than a sixpence. In the barren frond the margin is open, but in the fertile it is permanently recurved as in *Jamesonia*, and at first pressed firmly against the under surface relaxing eventually and disclosing the hitherto included sori, the superficial receptacles of which are a line or less long.—Endemic.

2. *G. elaphoglossoides*, BAKER.—*Rootstock* erect, subglobose densely clothed in dark silky reticulated acuminate scales  $\frac{1}{3}$ – $\frac{1}{6}$  li. w., 2–3 li. l. *Stipites* tufted spreading, strong often flexuose 10–15 in. l., scaly at the base, dark brown or stramineous. *Fronde*s simple coriaceous, pellucid, pale yellowish green glossy, naked, barren, ovate, 6–7 in. l., 3 in. w., blunt or rounded at the upper end, the base sub-cordate and the auricles rounded, fertile lanceolate 6–9 in. l., 1–2 in. w., bluntly or acutely pointed, the base cordate. Margins thin, entire, usually somewhat repand, flat or reflexed. Costa, stramineous, prominent beneath. *Veins* immersed or superficial, fine, very close, spreading at right angles from the costa, once or twice forked the apices clavate. *Sori* sunk in linear grooves which extend from the costa nearly to the margins, at length laterally confluent, concealing the under surface. Baker in Trans. Linn., Soc. ser. 2, Bot. Vol. II, p. 293, pl. 54.

Guiana; im Thurn Nos. 101 and 215, gathered on the slope ascending to the base of Roraima. The nearest species in affinity to this American novelty is the Australian *G. marginata* Mett., except in colour, it has the general habit and aspect of *Acrostichum latifolium*, Sw., and the veins lie so very close together that the whole under surface is covered by the sori leaving only a narrow base round the margin. In the barren fronds the veins are superficial, and the surface striated with a narrow linear groove over them in which the sori are immersed and isolated at first, becoming confluent as it matures.—Endemic.

3. *G. pumila*, SPRENG.—*Rootstock* filiform, erect, clothed with hair-like reticulated, ciliate-edged brown scales. *Fronde*s membranous, glossy naked, green tufted, few V shaped or flabellate-crenate occasionally linear-cuneate,  $\frac{1}{2}$ – $1\frac{1}{2}$  in. l., 1–6 li. w., at the apex the lateral margins entire, the outer jagged or deeply incised, often into narrow spreading sharp-pointed segments and gradually attenuated downwards to a slender filamentose base, with hardly any clear stipites. *Veins* close, flabellate, dichotomously forked. *Sori* linear, becoming confluent laterally, forming one or more broadish patches on the more entire portion of the outer parts of the fronds. Hook. 2nd Cent. Ferns t. 8.

Var. *A. Hecistopteris*, J. SMITH—Fronde shorter and broader and deeply cut into spreading linear segments which devaricate like stags' horns.

Communal, forming large or small patches in moss on the trunks of trees. Gathered by March, whose specimens are at Kew. It varies greatly in shape and degree of cutting from linear with two or three sharp segments on teeth at the apex, to broadly flabellate or multifid to the base, the lines of sori are at first free but ultimately unite laterally, forming apparently amorphous patches but in Var. *A* there are only one or two lines to each narrow segment.—Cuba, Trinidad, Guadeloupe, Guatemala to Brazil.

4. *G. rufa*, DESV.—*Rootstock* fibrous upright. *Stipites* tufted erect, chestnut brown, polished, rusty villose 4–10 in. l. *Fronde*s pinnate thin and rather soft, surfaces slightly pubescent under paler than the upper, oblong-lanceolate 1–1 $\frac{1}{4}$  ft. l., 4–5 in. w., rachis like stipes but less villose. *Pinnæ* entire spreading horizontally oblong-lanceolate sub-distant, stipitate and articulated at the top of the pedicils, 1–2 $\frac{1}{2}$  in. l.,  $\frac{1}{4}$ –1 in. w., rounded or sub-cordate at the base, shortly acuminate 6–9 to a side with a similar terminal one, the lowest pair not or very little smaller, mid-rib slender. *Veins* close much curved in fascicles two or three times forked, fine terminating within the even margin. *Sori* copious, linear on the veins extending usually from the mid-rib to near the edge. *Aerostichum*, Sw., *Neurogramme*, Link., *G. acuminata*, Klf.

Jamaica; common on dry banks below 2,000 feet altitude, especially abundant about Hope and Gordon Town, well marked by the simply pinnate habit and the copious rusty pubescens, the stipites and rachises, though not slender are very fragile, they stand dead with the live fronds, spurred at intervals with the short pedicils of the pinnæ which have all dropped away. The latter are about 10–15 to a side. The upper ones are very little reduced, passing abruptly into the larger free terminal segment.—West Indies and Tropical America.

5. *G. gracilis*, HEWARD.—*Rootstock* erect or oblique, scaly. *Stipites* caespitose short, scaly. *Fronde*s bi-pinnatifid chartaceous or sub-coriaceous, slightly ciliate paler beneath, oblong-lanceolate usually spreading or pendent, 2–4 ft. l.,  $\frac{3}{4}$ –1 $\frac{1}{2}$  ft. w., acuminate, the base gradually reduced. *Rachis* rather slender, lightly brown, channelled, more or less ciliate or pubescent as are the costæ. *Pinnæ* spreading, sessile, very numerous contiguous above, below sub-distant or distant and dwindling nearly to the base of the petiolis into very minute segments, central ones 5–10 in. l., 1–1 $\frac{3}{4}$  in. w., very acuminate, pinnatifid nearly to the costæ. Segments linear-oblong, straight or falcate, blunt close or in the larger states with a rounded sinus between less than  $\frac{1}{2}$ –1 in. l., 1 $\frac{1}{2}$ –2 li. w. *Veins* oblique, 10–16 to a side. *Sori* close to the margins, the edges of which are entire and often reflexed. *Polypodium Hewardii*, Gr. Fl. B. W. I., p. 696.

Jamaica; very abundant on banks at 4,000, 6,000 ft. altitude. The stipites usually are only 1–3 in. l., below the dwindling segment-like pinnæ. The sori are short, and so near the margins that the reflexed edges partially cover them. The lowest pair of opposite veins enter above the sinus. This and the two following have quite the habit and aspect of a *Nephrodium*.

6. *G. consimilis*, FÉE.—*Rootstock* short, erect, scaly. *Stipites* caespitose very short, 1–3 in. l., brown or dark coloured scaly. *Fronde*s bi-pinnatifid chartaceous, pubescent, dull green, paler beneath, lanceolate or ovate-lanceolate, acuminate gradually reduced at the base, 2–3 ft. l., 8–12 in. w., spreading or prostrate. *Pinnæ* spreading, oblique apart, the lower ones, which dwindle at the base to mere segments usually distant, 4–6 in. l.,  $\frac{3}{4}$ –1 in. w., sessile, very acuminate, cut almost to the costæ into blunt or acute, straight or sub-falcate narrow segments,  $\frac{1}{3}$ – $\frac{1}{2}$  in. l., 1 $\frac{1}{2}$  l.b., the bases very slightly dilated, with an acute or rounded sinus between. *Rachis* slender channelled, brown pubescent. *Veins* oblique 9–12 to a side. *Sori* medial a little short of both mid-ribs and margins.

Jamaica; common, in the parishes of St. Mary and St. Andrew, in woods on shady places, near or not distant from the banks of rivers at 500–1,000 feet

altitude. This differs from the preceding and following species by its medial sori and more pubescent surfaces. It is smaller and often relatively broader than *G. gracilis*, of a duller colour, and with longer sori. The margins are not, as a rule reflexed, and the lowest pair of opposite veins enter them above the sinus.

7. *G. diplazioides*, DESV.—*Rootstock* erect, 6–12 in. l., brown, dark coloured at the base with a few deciduous scales. *Fronde* bipinnatifid, chartaceous, pellucid, nearly glabrous, clear green, pale beneath, erect, lanceolate 2–3 ft. l., 6–9 in. w., acuminate reduced at the base. *Rachis* brown, channelled puberulous on the face. *Pinnæ* spreading, distant, or sub-distant 3–4 in. l.,  $\frac{3}{4}$  in. w., sessile and usually broadest at the base, the apex entire and more acute than acuminate cut down about  $\frac{3}{4}$  to the costæ into flat broadish blunt or rounded segments which are widest at the base, and 2 li. b., the lowest pair usually enlarged. *Veins* 6–9 to a side the lower ones often forked the opposite basal pair entering the sinus. *Sori* nearer the margin than mid-rib, linear on the lower veins and double when they are forked. *Phegopteris Duchassagniana*, Fée. Fil. Ant. t. 14, fig. 3.

Jamaica; frequent by the open way-side in the neighbourhood of Second breakfast spring, near Mount Moses, St. Andrew, at 2,000–3,000 ft. altitude. This differs from the other two species, by its erect habit longer stipites, firm reduced pinnæ at the base which are not so small, clear coloured and nearly naked surfaces. Pinnæ acuminate, less deeply pinnatifid and broader segments, the lowest pair usually enlarged, fewer and more open veins, the lowest pair, of which meet at the sinus, and are often fibrous, with invariably longer sori than those above. The sori are prominent on the clear pale under surface.—West Indies to Peru and South Brazil.

8. *G. charophylla*, DESV.—*Rootstock* short, fibrous, upright. *Stipites* tufted few or many, erect, 4–6 in. l., slender, the base chestnut brown, above this, green naked. *Fronde* subdeltoid, membranous herbaceous, naked, dark green, close, 3–4 in. each way, tri-quadrifid, lowest pair. *Pinnæ* largest, and rather distant from the next above, all erecto-spreading and freely petiolate; pinnulæ also stipitate tertiary segments flabellate-cuneate,  $1\frac{1}{2}$ – $2\frac{1}{2}$  li. b., once or twice cut to the base into similar segments, the outer margin freely toothed, rachis and costæ flat and margined, slender, green. *Veins* dichotomously forked, flabellate, terminating in the final tooth which are  $\frac{1}{4}$  li. w. *Sori* copious linear, occupying all the veins their entire length, and confluent or nearly so laterally, pale or brown coloured. Pl. Fil. t. 50, C. Hooker and Grev. Icon. t. 45. *G. leptophylla*, Eat. *Anogramme*, Lk.

Jamaica; frequent at 4,000, 5,000 ft. altitude on damp banks, rocks and way-sides and generally plentiful where found. This is a tender herbaceous plant, of great fecundity but short individual duration and hence regarded as an annual. It is most abundantly soriferous the underside being covered with the contiguous almost confluent lines of pale brown sporangia. The lowest pair of pinnæ are often so much larger and distant from the others that the fronds in these instances appear tripartite.

9. *G. Schomburghiana*, KZE.—*Rootstock* fibrous, erect or oblique. *Stipites* tufted, rather slender costaneous, polished, slightly villose below 1– $1\frac{1}{2}$  ft. l. *Fronde* oblong-lanceolate or lanceolate  $\frac{3}{4}$ –1 ft. l., 2– $3\frac{1}{2}$  in. w., at the base, chartaceous very pellucid bright green scaly, chiefly on the flat margined costæ, tripinnate. *Pinnæ* sessile,

or stipitate spreading, lowest ones 2-2½ in. l., ¾-1 in. w., distant or sub-distant contiguous above and passing into mere lobes at the apex pinnules 2-6 to a side contiguous or apart rounded, ¼-½ in. l., less w., the larger pinnatifid, others lobate roundly dentate on the rounded outer margin. *Rachis* slender, castaneous, channelled cartilaginous margined, slightly scaly or naked. *Veins* open flabellate simple in the final lobules or dentations, not reaching the edge. *Sori* linear, free or becoming laterally confluent over the disk of the segments, Hooker and Baker Syn. Fil. p. 382, 2nd Cent. Ferns. t. 92.

Guiana; Schomb. 1190, Appun. 10911, im-Thurn. 164, gathered only at Roraima. The specimen figured by Sir W. Hooker is a small one, the specimen growing several times larger than it. The final segments are nearly round, 2-3 l. in diameter with shallow rounded teeth, the larger ones rather lobate. The fertile fronds have petioles twice as long as those of the barren, which they greatly over top.—Endemic.

10. *G. hirta*, DESV.—*Stipites* erect, 1-1½ ft. l., blackish chestnut brown, polished channelled, slightly ciliate or scaly at the base. *Fronds* elongated, 1-1½ ft. l., 3-6 in. w., chartaceous pellucid, pale glossy green, ciliate beneath, and above at the base of the flat grooved flexuose costulae, tri-quadrifid pinnatifid. *Rachis* blackish, polished, naked, channelled. *Pinnæ* numerous, spreading horizontally the inferior petiolate, lanceolate, or ovate-lanceolate, broadest toward the base and tapering outwards to the blunt point, 2-3 in. l., 1-1½ in. w. Secondary segments, oblong, broadest at the base, blunt ¼-¾ in. l., less broad. Tertiary, flabellate 1½-2½ w., each way mostly cut into three spreading lobes, which are uniformly bluntly toothed. *Veins* pellucid, open flabellate, terminating short of the margin, one in each tooth. *Sori* elongated, copious on the inner divisions of the veins. Syn. Fil. p. 384.

Guiana; im-Thurn. n. 197, upper slope Roraima, a new discovery to the country. A more deeply cut species than *Schomburghiana*, with long relatively narrow fronds the same width from end to end, horizontal pinnæ and very strong highly polished blackish petiole and rachis; the latter freely flexuose. It comes between *G. scandens*, Fée and *G. Warcewiczii*, Mett.—United States of Columbia.

11. *G. flexuosa*, DESV.—*Stipites* tufted, slender, erect, bright castaneous, slightly pubescent. *Fronds* scandent, quadri-pinnate, gradually elongating in growth 1-2 or more ft., l., 4-10 in. w., thin, pellucid, bright green, glabrous, or slightly ciliate. *Rachis* slender brightly castaneous, channelled, flexuose, as are the more slender and paler costæ. *Pinnæ* spreading, 3-8 in. l., 2-4 in. w., petioled, distant, alternate. *Pinnæ* similar in shape but much smaller, tertiary segments flabellate, ¼-¾ in. l., less broad; quadriary also flabellate, cut into retuse or trifid lobes, the final segments ½ li. w., and rounded. *Veins* pellucid, simple in the ultimate segments, being near the centre or base the oblong sori. Hooker and Baker, Syn. Fil. p. 384, Hook. and Grev. Bot. Misc. 3, t. 112.

Guiana; im-Thurn. n. 159, upper slope Roraima; by its scandent habit flexuose parts and narrowly cut final segments closely resembles *Davallia fumarioides*, and as in that species the fronds extend upwards, the upper part continuing to grow and constantly elongate after the lower part is matured. In this and the next the cutting of the final parts to the axis into narrow linear segments, simple or retuse, is very similar, but in this they are more divaricating and not nearly so slender.—Venezuela, Nicaragua, and Peru.

12. *G. schizophlla*, BAKER.—*Rootstock* fibrous, erect or oblique. *Stipites* tufted, slender, erect, early farinose, dark chestnut brown, polished, 1–3 in. l. *Fronde*s membrano-herbaceous naked, and bright green, lanceolate, or oblong-lanceolate  $\frac{1}{2}$ –1 or  $1\frac{1}{2}$  ft. l., 2–3 or 5 in. w., triquadri-pinnate, slender, channelled, castaneous, polished; generally producing a farinose bud, and often forked close below the apex. *Pinnæ* numerous, contiguous, spreading,  $1\frac{1}{2}$ –3 in. l.  $\frac{3}{4}$ –1 in. or over w., lower ones usually reduced. Pinnulæ very freely and deeply cut ultimately into delicate spreading 2 fid cuneate segments with narrow emarginate linear divisions  $2\frac{1}{4}$ – $\frac{1}{2}$  li. w., costæ filiform and brown at the base the outer part flat, margined and green, as are the ribs of the outer divisions. *Veins* pellucid, forked, simple in the final segments. *Sori* copious, oblong medial, one to each segment. Journal Botany 1877, p. 266, Hook. Icon. t. 1682.

Jamaica; infrequent at 4,000–4,500 ft. altitude on open or shady stony grounds rediscovered in 1875 at “Old England” Coffee Plantation, and now the Government Cinchona Plantation, where it was collected in 1853 by Miss Taylor whose collection was not examined however till 30 years later. This is the most finely cut species of all. The fronds resemble very much the pinnulæ of *Davallia fumarioides*. They sometimes extend considerably by the bud which is produced near the top.—Endemic.

13. *G. trifoliata*, DESV.—*Rootstock* fibrose scaly erect, or oblique. *Stipites* tufted, stiff erect 9–18 in. l., blackish polished faintly channelled, fibrillose at the base. *Fronde*s 2–4 ft. l., 4–6 in. w., firm or sub-coriaceous naked, and dark bright green above, beneath coated with yellow farina, erect, rachis stiff, coloured like the stipites slightly scaly and farinose, at first ultimately naked. *Pinnæ* numerous distant petiolate-digitate form, composed of 1–3 spreading linear acuminate pinnulæ, which are 3–4 in. l. and  $\frac{1}{4}$  in. w., those of the lower pinnæ usually barren, of the upper fertile, each with a prominent raised costa beneath; the edge very finely cuneate-serrate. *Veins* fine curved, close, dichotomously forked. *Sori* linear, confluent. Hooker Gard. Ferns. t. 4, Pl. Fil. t. 144.

Jamaica: common, gregarious in open marshy places, below 2,500 ft. altitude, general by the sides of permanent trickling streams, the upper pinnæ are simple the next below 2 foliate, those below these, which are the large majority, 3 foliate; the centre pinnule in each pinnæ being the largest. The veins are so close that the sori quite cover the surface. It is a stiffy erect tall and robust species that forms large communities often crowded together from the plants which have grown from viviparous buds produced on the roots.—Cuba to Brazil and Peru.

14. *G. tartarea*, DESV.—*Rootstock* fibrous densely scaly, erect or oblique. *Stipites* caespitose usually spreading, strong  $\frac{1}{2}$ – $1\frac{1}{2}$  ft. l., castaneous or blackish, polished, channelled, deciduously scaly at the base. *Fronde*s 1– $2\frac{1}{2}$  ft. l.  $\frac{1}{4}$ – $1\frac{1}{4}$  ft. w., sub-coriaceous naked and dark green above, beneath densely coated with white powder, usually widest at the base, varying from lanceolate to ovate-acuminate to bitripinnate. *Pinnæ* numerous, spreading or erecto-spreading, more or less distant below sessile, or the lower ones stipitate, lanceolate-acuminate, 3 in. l.,  $\frac{1}{2}$ – $2\frac{1}{2}$  in. w. *Pinnulæ* contiguous or apart, oblong, acute or rounded, adnate to the costæ, or the inferior ones free, entire, auricled at the base, more or less lobed or pinnatifid,  $\frac{1}{4}$ – $1\frac{1}{2}$  in. l.,  $1\frac{1}{2}$ –6 li. w., the margins entire and rather reflexed. *Veins* 1–3

times forked. *Sori* copious, confluent and often covering the surface. *Rachis* strong channelled polished and coloured like the stipites. *G. dealbata*, Link., *Hemionites*, Will'd., *Acrostichum*, Swartz.

Jamaica; abundant in open places, banks and dry woods from 3,000–6,000 feet altitude. (Seldom seen below 3,000 feet, Ed.) Very variable in size and cutting. The normal state is nearly simple bipinnate and a larger fully tripinnate state is at the higher altitude. The powder is as a rule very white, but there is a beautiful golden state in Dominica. *G. ornithopteris*, Kl., also gathered in Jamaica more rigid than the type, the pinnae resembling pinnulae of *Pteris aquilina*, the edges of the segments revolute. This is a much stiffer plant than *calomelanos*, of spreading (not erect) habit, with less cut broader more obtuse segments and whiter powder.—Tropical America.

15 *G. triangulata*, JENM.—*Stipites* tufted, from an erect fibrous scaly rootstock, slender, 1–1½ ft. l., very dark, polished deciduously, scaly at the base, *Rachis* slender like coloured, channelled. *Fronde* tri-pinnatifid ovate-deltoid, acuminate, broadest at the base, spreading ¾–1½ ft. l., ½–1 ft. w., firm chartaceous, upper surface bright clear green, under sparingly coated with white. *Pinnæ* spreading petiolate, the lowest pair largest and rather deeper on the under side 4–6 in. l., 1½–2 in. w., lanceolate-acuminate; pinnulae oblong, broadly rounded at the lobed or subentire apex, ½–1 in. l., ¼–⅓ in. w., uniformly pinnatifid, final segments apart, short, rather ovate or rounded, narrowed or cuneate at the base, 1–1½ li. b., outer edge entire or dentate. *Veins* pellucid, dichotomously forked, flabellate. *Sori* linear confluent.

Jamaica; infrequent at 4,000 ft. altitude, gathered at Moodys Gap, St. Andrew. A broader less coriaceous and more freely cut plant than *tartarea* to which it is more closely allied than *calomelanos*, with the final segments not broadly adnate as is that species, but narrowed or more or less free at the base. It is uniformly tri-pinnatifid, and shows hardly any variation in its characters; of the three species it is much the prettiest, all the vascular parts are relatively slender, the lower pinnae are sub-distant and the upper ones are not close, and generally the fronds narrow directly from the base upwards. The slender costae are rather flexuose and flat, and margined in the outer part. The rachis is often to the same slight degree flexuose at the top. It differs from *G. peruviana*, which species it most nearly approaches by being more lax in habit and having no powder on the upper surface.—Endemic.

16. *G. calomelanos*, KAULF.—*Rootstock* fibrous, scaly, erect. *Stipites* densely tufted, erect polished, blackish, or dark castaneous, with a few deciduous scales at the base, 1–2 ft. l. *Fronde* erect, 1–2 ft. l., ¼–1 ft. w., lanceolate or ovate-lanceolate, acuminate, chartaceous, naked and dark glossy green beneath white or grayish with copious farina bi-pinnatifid. *Rachis* channelled polished and coloured like the stipites. *Pinnæ* numerous erecto-spreading, more less distant below, petiolate, lanceolate-acuminate 3–6 in. l., 1–2 in. b., pinnulae contiguous or sub-distant, sessile and cuneate, acute-pointed or sometime acuminate, linear-lanceolate, simply toothed or deeply pinnatifid in the lower two-thirds, the outer part entire ½–1¼ in. l., 2–4 li. w., lobes acute, the lowest largest. *Veins* close curved, once or twice forked. *Sori* linear, confluent, covering the whole surface at maturity. Pl. Fil. t. 40.

Var. *A.*—*G. Martensii*, BORY.—*Fronde* bi-pinnate, pinnulae ovate-oblong entire or the inferior lobed one or both sides at the base powder pale yellow.

Var. *B*.—*G. chrysophylla*, KAULF.—*Fronde*s uniformly pinnate stipites and rachises castaneous; powder deep yellow. Pl. Fil. t. 44.

Jamaica; abundant in the lowlands and among the lower hills throughout the Island on open banks and exposed rocky places, fully open to the sun. A very hardy plant. Found in Jamaica from the wettest districts to the arid plains of Liguanea, St. Catherine and Clarendon. Distinguished from its allies by the erect habit sharp pointed segments and more herbaceous texture. *A* is usually smaller than the type, and reaches a higher elevation. This and *B* are abundant at the old mines near Hope and Gordon Town, the latter is as large as the type. Widely distributed.—West Indies generally, South America, Africa.

17. *G. sulphurea*, DESV.—*Stipites* densely tufted from a fibrous erect or oblique rootstock, slender, castaneous, glossy, 2–4 in. l. *Fronde*s spreading lanceolate or the larger ovate-lanceolate, acuminate herbaceous upper side naked and bright green, under densely covered with green powder  $\frac{1}{2}$ – $1\frac{1}{2}$  ft. l., 3–6 in. w., bi-tripinnatifid somewhat reduced at the base, the rachis slender castaneous, polished. *Pinnæ* spreading or erecto-spreading, distant below, nearly sessile, lanceolate  $1\frac{1}{2}$ –4 in. l.,  $\frac{1}{2}$ –1 in. w. Pinnulæ  $\frac{1}{4}$ – $\frac{1}{2}$  in. l., 2–4 l. w., oblong blunt, or rounded, and dentate at the apex, widest at the base, lobed or pinnatifid tertiary segments ovate-oblong on the lower; flabellate-cuneate, 1–2 li. w. and l., dentate or inciso-dentate, the teeth retuse. *Veins* forked, oblique pinnate in the pinnulæ. *Sori* oblong often confluent. Pl. Fil. t. 48, B. (*A*) *G. Wilsoni*, J. Sm., in lit. *Fronde*s 3–5 in. high  $\frac{1}{4}$ – $1\frac{1}{4}$  in. w., short petioled. Rachis margined in the upper part, pinnæ and segments close, somewhat crispate, freely sori-ferous, powder not copious.

Jamaica; frequent on damp banks and under the shade of rocks from the lowlands up to 4,500 feet altitude a much more delicate and slender plant than any of the yellow states of *calomelanos* with shorter sori, obtuse lobes, and deeper coloured powder. Of the small variety *G. Wilsoni*, J. Smith, there are specimens both in the Kew and British Museum Herbaria, collected by Wilson near Arnully Gap St. David and I have gathered it myself at several places above 3,000 ft. altitude. It is often nearly devoid of powder more leafy and deeply incised with sharper and more emarginate teeth than the type. Wilson says it does not grow larger than his specimens, which are 3–4 in l., and an inch or less wide. It varies however in size and my specimens exceed his, (and mine Ed.) but it is never large.—West Indies.

### GENUS XXXIII.—ENTEROSORA, Baker.

*Sori* linear oblong, immersed on the veins within slits of the parenchyma of equal length which at first quite enclose it with connivent edges but are subsequently open, forming one or two irregular series on each side of the mid-rib directed obliquely to the margins. *Veins* forked oblique the branches more or less uniting at the margin. *Fronde*s simple.

A remarkable monotypic genus that differs from the rest of this group in having the sori enclosed within the parenchyma in slit-like cavities of the cuticle so that when young as seen, held up to the light it seems to be quite inside the frond.

*E. Campbellii*, BAKER.—*Rootstock* as thick as a quill or less short or elongated, fibrous below, the apex freely clothed with small brown reticulated scales. *Stipites* tufted 3–5 in. l., wiry dark brown sparsely clothed with spreading brown hairs, articulated and clavate

at the base. *Fronde* linear oblong or oblanceolate 3-6 in. l.  $\frac{1}{2}$ -1 in. w., coriaceous, pellucid, slightly ciliate at first, chiefly on the margins, at length glabrous, the base tapered, the apex obtuse, the sides even sinuate or lobate, mid-rib and veins concealed in the parenchyma, the latter very oblique, branched, the ends united within the margin. *Sori* 1-1 $\frac{1}{2}$  li. l., oblique 1-2 series chiefly in the upper half or two-thirds of the frond, immersed in slit-like cavities, the edges of which at length open and abundantly reveal the ruddy erupting sporangia. Baker in Trans. Linn. Soc. Ser. 2, Bot. Vol. II, p. 294 Pl. 55, E. Fawcettii, Jenm. in Gard. Chron. 20 August, 1895.

Rare on the tops of high trees in the forests where *Lælia monophylla*, grows, Rose Hill, and Green Hill Wood, St. Andrew's Parish. The species was first gathered on Roraima, British Guiana in 1884 and in Jamaica three years later. Better Jamaica material, gathered recently (1895) show that the plants from the two countries are the same only differing partly in vestiture and size. The fronds are occasionally forked apically or laterally on both and forms a very close general resemblance to *Polypodium trifurcatum*, Linn., with which it grows at Roraima, and from which indeed it was mistaken when first gathered. The *sori* are sometimes on the free veins enclosed in the areolæ of the connecting branches and again on the latter. (See *Polypodium*, pp. 268 and 302 Ed.)

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#### GENUS XXXIV.—HEMIONITES, Linn.

*Sori* in continuous forked or reticulated lines superficial on the veins, the entire ramification of which is sporangiferous. *Veins* anastomosing little or much reticulated. *Fronde* entire, palmate or pinnate.

Hemionites differs from *Gymnogramma* by the *sori* being continuous and more or less reticulated, and co-extensive with the venation. It is a small tropical genus of less than a dozen species, half of which belong to the American meridian, and the rest to India, Java and Fiji. The plants are of relatively small size or stature and grow in open situations on banks and rocks.

*Fronde* palmate.

1. *H. palmata*.

*Fronde* pinnate.

2. *H. pinnata*.

1. *H. palmata*, LINN.—*Rootstock*, fibrous, rather slender clothed with marrow, tawny scales. *Stipites* tufted erect,  $\frac{1}{2}$ -1 ft. l., dark coloured, and rather glossy, deciduously villose, and scaly at the base. *Fronde* membrano-herbaceous, densely pellucid dotted, dark green, tawny villose, palmatifid 3-5 in. each way composed of 5 acute diverging nearly equal divisions that are  $\frac{1}{2}$ -1 $\frac{1}{4}$  in. w., 1-2 $\frac{1}{2}$  in. l., entire or cut into broad rounded appressed shallow lobes. *Veins* copiously reticulated. *Sori* occupying the entire venation, forming copious elevated areolæ which gradually diminish outward to the margins. Barren *frond* prostrate, smaller, often only tripartite with rounded lobes, viviparous in the sinuses, on much shorter slender stipites.—Pl. Fil. t. 151, Sl. Herb. p. 45, Hook. Fil. Exot. t. 53.

Jamaica; common on open exposed banks below 2,000 ft. altitude, well marked by the pedate-palmate form of the fronds and copiously reticulated venation and elevated sori. Though the stipites are stiff they are fragile and



easily broken by wind or other pressure. Occasionally the fertile fronds produce buds in the axils of their divisions. The plants vary much in size and on dry banks may be gathered down to an inch in diameter of leaf. In these small fronds the basal divisions are shorter than the others. It is known locally by the name of "Strawberry-fern."—West Indies generally, and Mexico to Peru.

2. *H. pinnata*, J. SMITH.—*Stipites* tufted from a small erect rootstock, 6–9 in. l., erect, castaneous glossy, rusty pubescent. *Rachis* similar. *Fronde*s erect 5–8 in. l., 3–5 in. w., membrano-herbaceous, densely pellucid, dark green glossy pubescent, the terminal segments subentire, lobed or pinnatifid, below this 3–5 pair of spreading distant pinnae, the lowest pair of which are largest and  $\frac{1}{4}$ – $\frac{3}{4}$  in. w., 2–3 in. l., the point acute or bluntish, the base free and slightly stipitate once lobed or forked on the under side, those above simple, oblong-lanceolate, adnate at the base, the upper ones broadly so. *Margins* subentire, or cut into broad shallow appressed lobes. *Veins* repeatedly forked, the branches close curved, partly free and partly anastomosing. *Sori* following the venation.

Jamaica; infrequent on grassy banks near Hope, above Dublin Castle near Gordon Town. First discovered in the same district at the beginning of the Century by Wiles. This has something of the aspect of *Gymnogramma rufa* which is also plentiful in the same habitat, but the few distant, mostly adnate pinnae, the lowest pair forked pinnatifid upper part, and narrow oblique areolae of the venation are characters which at a glimpse distinguish it.—Endemic.

## GENUS XXXV.—ANETIUM, Splitz.

*Sori* thinly scattered on the veins but sparingly diffused as well on the surface between, sometimes in small groups or larger amorphous patches. *Fronde*s simple, venation copiously reticulated.

A monotypic *genus* with affinity to two or three generally accepted genera, but presenting in each case sufficient dissimilarity to prevent its association therewith and warrant a separate recognition. The texture, venation, habit and to some extent aspect, show a near and natural alliance with *Antrophyum* from which the diffused sori distinguishes it.

1. *A. citrifolium*, SPLITZ.—*Rootstock* fleshy, free creeping, clothed with much attenuated narrow reticulated distantly toothed scales. *Stipites* scattered, firm hardly any clear to 3 in. l., or more, dark coloured. *Fronde*s entire, densely pellucid-dotted, membrano-herbaceous oblong-lanceolate, pendent, variable in size  $\frac{1}{4}$ – $1\frac{1}{4}$  ft. l., 1– $3\frac{1}{2}$  in. w., obtuse acute or shortly acuminate, the base gradually tapering and decurrent on the petioles. Costa prominent, below, but evanescent at the apex. *Veins* reticulated, areolae copious very oblique. *Sori* sparse much diffused, sporangia minute.—Pl. Fil. t. 116, *Acrostichum*, Linn., *Antrophyum*, Fée., *Hemionites*, Hooker and Baker.

Jamaica; infrequent on trees in damp forests of the Eastern Parishes below 2,000 ft. altitude. Common in Trinidad. Variable in size the larger fronds occasionally 3 ft. l., and  $\frac{1}{2}$  w., sometimes broadly furcate or the upper part curiously cut into sharp shortly extended lobes. While fresh the leaves are fleshy, but in drying become membranous.—West Indies to Brazil

## GENUS XXXVI.—ANTROPHYUM, Kaulf.

*Sori* in zigzag reticulated or straight lines, situated on the veins oblique to or parallel with the margins and costa, superficial or sunk in shallow grooves. *Veins* reticulated. *Fronde* entire.

A small strictly tropical genus numbering about twenty species which are widely diffused. About a fourth of the number are American, they have narrow linear or lanceolate leaves, of a dull cloudy colour, which grow a few together or in dense patches on trees and rocks. They are found only in very humid regions and under prolonged drought shrivel up. The rootstocks are fleshy but slender, and the roots are densely tomentose and form sponge-like masses retentive of water and very useful to Orchids growers.

*Sori* immersed in parallel longitudinal furrows.

1. *A. lineatum*.

*Sori* superficial in angular areolæ or zigzag lines.

*Fronde* under 1 in. wide—

2. *A. lanceolatum*.

*Fronde* over 1 in. wide—

3. *A. cayennense*.

4. *A. subsessile*.

1. *A. lineatum*, KAULF.—*Rootstock* repent short or elongated, clothed with acuminate clear reticulated scales. *Stipites* few or several, more or less clustered, an inch or two long or less, passing insensibly into the fronds. *Fronde*  $\frac{1}{2}$ –1 ft. l.,  $\frac{1}{4}$ – $\frac{1}{2}$  in. w., firm densely pellucid dotted dull cloudy green linear ligulate tapering at both ends, long acuminate. Margins even, costa concealed on the upper side but widest beneath. *Veins* forming narrow much elongated areolæ running parallel with the costæ and margins. *Sori* sunk in two or three equidistant longitudinal grooves, between the costa and margins only the outer ones interrupted. *Vittaria lanceolata*, Sw., *Polytaenium*, Desv.

Jamaica; plentiful in very damp forests in the middle and upper mountain regions reaching 6,000 ft. altitude an abnormal species. With *Antrophyum* it agrees entirely in texture, aspect and habit, but in all other characters is more allied to *Vittaria*, to which Swartz ascribed it, and from which in fact it only differs technically in the lines of sori and areolæ being multi-serial.—West Indies to Brazil.

2. *A. lanceolatum*, KAULF.—*Rootstock* short creeping densely tomentose, clothed with small linear acuminate dark brown reticulated scales. *Fronde* firm densely pellucid-dotted, a dull cloudy green, contiguous linear-lanceolate, long tapering both ways below quite to the base of the stipites  $\frac{1}{2}$ – $1\frac{1}{2}$  ft. l.,  $\frac{1}{4}$ – $\frac{7}{8}$  in. w. The margins even or rather irregular, thin, costæ strong and raised beneath at the base in the larger fronds, slender or vein-like at the apex. *Veins* reticulated areola chiefly oblong the inner line narrow much elongated and parallel with the costa as is also the next series, the outer ones oblique falling short at the edge. *Sori* linear parallel with, or oblique to the costæ.

Jamaica; on the trees forming spreading patches, below 2,000 ft. altitude. In the narrow fronds the areolæ are only two serial, and run parallel with the mid-rib and margins, when broader, the outer meshes are oblique.—West Indies and Tropical America.

3. *A. cayennense*. LAURE.—*Rootstock* shortly repent, fasciculated, forming with the light brown hair that densely clothes it, sponge-like patches. *Stipites* approximate or subtufed erect, or sub-erect  $\frac{1}{2}$ –3 in. l., margined. *Fronde* erect  $\frac{1}{4}$ –1 ft. l.  $\frac{1}{2}$ –2 in. w., firmly membranous dark cloudy green lanceolate, very acuminate tapering equally both ways. Costa flat, raised beneath, evanescent at the apex, margins even or little repand. *Veins* reticulated conspicuous, areolae oblique, running in curved succession to the margin. *Sori* impressed on the veins.—Hooker and Baker, Syn. Fil. p. 394.

Trinidad and Guiana: on trees in damp forest, very abundant. In size this is much the most variable species, the plants being found fully fertile from an inch or two, to a foot high. From *subsessile* it is easily distinguished by the acuminate relatively narrower fronds, equally tapering from the middle both ways, longer petioles, ciliate-edge scales and brown tomentose rootstock, more conspicuous venation, with broader and shorter areolae, and more distinctly impressed sori. Their habits differ, one growing on rocks and the other on trees.—Brazil.

4. *A. sessile*. KZE.—*Rootstock* repent short or elongated, clothed with brown reticulated even edged scales. *Stipites* hardly distant or reaching  $1\frac{1}{4}$  in. l. *Fronde* firm, pellucid, dotted, dull green above pale beneath, erect or subpendent, subtufed, few or several,  $\frac{1}{2}$ –1 ft. l., 1–3 in. w., oblong-lanceolate or oblanceolate, the apex acute obtuse or rounded, tapering in the lower half to the winged base, the margins thin, even or irregular costae, raised in the lower part and flat on both sides. *Veins* freely reticulated, falling short of the margins: areolae copious oblong, oblique. *Sori* linear, the veins curved zigzag or reticulated, quite superficial.

Jamaica: infrequent on the sides of large stones and rocks in wet forests at 6,000 ft. altitude. Gathered in a steep gully above the Portland road, not far from the Government Cinchona Plantation where a good many plants were found. It varies in size: the Jamaica specimens are mostly small under 6 in. l., and an inch wide, but occasionally much larger in Guiana it is 8–12 in. l. and 2–3 in. w. It has broader fronds than any of the other species, broadest above the centre becoming thus oblanceolate or spatulate-lanceolate with short winged stipites.—Trinidad, Cuba to Guatemala and Peru.

### TRIBE XIII.—VITTARIEÆ.

*Fronde* entire rarely forked or pinnate, linear ligulate or ensiform, tufted or scattered. *Veins* copiously reticulated, transversely connected or quite free, in some cases quite absent. *Sori* linear, costal or submarginal running parallel with the margins, continuous or casually interrupted sunk in a groove or slit or superficial. *Sporangia* stipitate with an incomplete vertical pointed ring splitting transversely when mature. *Receptacles* special or not.

This is a small tribe which is difficult to place with satisfaction, as it possesses no very obvious affinity. In some cases the sori are more or less embraced before maturity by the recurved margins of the fronds or connivent sides of the furrows and this feature together with the linear and transverse or longitudinal character of the sori gives it some claims to follow *Pteridia* and *Blechnae* from which however the entire absence of special involucres removes it under this arrangement. The genera which comprise it consist of a few grass or ribbon-like fronded species, which are chiefly epiphytical on trees or rocks. They are spread through the torrid belt quite round the world, being about equally divided between the Eastern and Western Hemispheres.

## GENUS XXXVII.—MONOGRAMMA, Schk.

*Fronde*s small, linear, simple or forked devoid of veins or with short simple or forked costal branches. *Sori* linear sunk, in a longitudinal cleft down the back of the costa or superficial on both sides of it, the two lines becoming confluent laterally.

About a dozen species form this genus which in their vascular parts are among the simplest of all ferns. They are small epiphytal grass-like plants mostly tropical in their range, through which region they are widely but not very generally diffused. About half the number are West Indian and American. The individuals grow alone or in communities and are infrequent or rare.

Fronde with a mid-rib only and no lateral veins.

1. *M. graminoides*.

Fronde with simple or forked lateral *veins*.

2. *M. minor*.
3. *M. seminuda*.
4. *M. immersa*.

1. *M. graminoides*, BAKER.—*Rootstock* slender cylindrical, erect, clothed with small brown scales. *Fronde*s tufted simple or casually forked at the top narrowed to the base of the filiform margined stipites 1–2 or more in. l., about  $\frac{1}{2}$  li. w., herbaceo-coriaceous, and stiffish, bright green naked; mid-rib distinct raised on the upper side but with no lateral veinlet. *Sori* oblong or linear-oblong, superficial on the back or sides of the mid-rib confined to the upper part of the frond where the edges are often folded or recurved. The margins below this flat *M. furcata*, Desv., *Pleurogramme graminoides*, Fée, *Grammitis*, Swartz., *Cochlidium*, Klf.

Jamaica; on trees, apparently rare as recent collectors have not gathered it. It was collected first by Swartz “on trees in the highest mountains,” Griesbach says; and subsequently by Wiles both of whose specimens are in the old collections of the British Museum Herbarium. J. Smith’s ferns; these also include specimens marked from Wiles in herb, Lambert, 1843. Very slender species marked by the absence of lateral veinlets and many of the fronds being furcated.—Brazil, St. Helena, Chili.

2. *M. minor*, JENM.—*Rootstock* filiform erect, minutely scaly. *Fronde*s tufted  $\frac{3}{4}$ – $1\frac{1}{2}$  in. l., about 1 li. w., in the broader upper part, the apex blunt, tapering gradually in the lower half or more to the base of the hardly distinct dark coloured very slender stipites, firm or coriaceous pellucid, naked bright green, mid-rib filiform, distinct flexuose covered by the parenchyma, raised on the upper side dark coloured beneath toward the base. *Veins* simple, very oblique open not reaching the margins. *Sori* linear or interrupted, confined to the upper half or third of the front but not reaching the top, biserial in a groove or depression along and close to the mid-rib which the lines at length quite cover, becoming confluent and superficial.

Jamaica; infrequent but communal on rocky banks scattered in beds of moss, gathered in the forest adjoining Murray’s Plat, near Mount Moses, St. Andrew at between 2,000 and 3,000 ft. altitude. It is clearly very rare, but

might easily be overlooked under the condition in which I found it. They are from six to a dozen leaves to each plant, which spread and curve upwards acquiring thereby a falcate form giving each other plenty of room. They are broadest in the upper half and thence to the base, the narrow wings reaching to the bottom of the slender purple stem. The venation is quite distinct, though immersed. Mr. Baker regards it a variety of *M. seminuda*, Bak.—Endemic.

3. *M. seminuda*, BAKER.—*Rootstock* erect, slender, cylindrical, fibrous the apex clothed with narrow light brown scales. *Stipites* tufted slender, dark coloured 2-3 li. l. *Fronde*s linear, sub-coriaceous light or brownish green beneath, dark above. Glabrous 3-5 in. l., 2 li. w., the apex obtuse, the base attenuated. Casually furcate, the margins thin, more or less even, mid-rib evident above, covered by the cuticle. *Veins* close, oblique, simple or forked, terminating within the margin with clavate apices. *Sori* linear in a groove occupying about  $\frac{2}{3}$  of the frond, not reaching the apex or base, originating close to the mid-rib on each side the two rows at length confluent and covering it, the margins of the groove sharp and sometimes replicate. *M. graminifolia*, Hook., *Blechnum seminudum*, Willd., *Pleurogramme linearis*, Presl.

On trees growing singly in upright tufts or a few plants near together. It differs from *immersa* by the much less rigid rather broader and flatter fronds which are not so much thickened down the centre and the sori consequently less deeply immersed. The colour is lighter green and brown beneath, it is many times larger than *minor* the fronds diffeetly shaped and closer, less oblique.—Jamaica, Trinidad, Brazil.

4. *M. immersa*, FÉE.—*Rootstock* elongated erect, freely clothed with brown narrow acuminate scales, the base fibrous. *Fronde*s tufted, erect or erecto-spreading, 3-6 in. l.,  $1\frac{1}{2}$  li. w., coriaceous and rigid, rather opaque usually curved, linear, the apex blunt or acute, tapering at the base to the short or hardly distinct stipites, when fertile much thickened down the centre and sub-triquetrous, the margin even and often folded together, glabrous bright grass-green, mid-rib distinct on the upperside covered in the parenchyma. *Veins* oblique immersed, both simple and forked, not reaching the margins. *Sori* sunk in a deep slit down the back of the mid-rib confined to the upper third half or two-thirds of the frond.

Jamaica; infrequent on trees on the ridges and peaks at 6,000-7,000 ft. altitude. The fibrous portion of the rootstock gradually elongates in a cylindrical form to occasionally three or four inches in length. The slit-like groove which contains the sorus is at first closed with connivent edges but as the fronds mature the sides of the grooves opens, showing the dark brown linear sori. The texture is particularly rigid.—Cuba, Venezuela, Guiana.

### GENUS XXXVIII.—VITTARIA, Smith.

*Sori* linear, sunk in a marginal or intermarginal slit or groove, rarely, slightly impressed or superficial, continuous and parallel with the margin. *Veins* simple oblique, prolonged and connected by a transverse anastomosis, which forms the receptacle. *Fronde*s entire linear or ligulate.

A small, almost strictly tropical genus, comprising about twenty species which are nearly equally divided between the old and the New World's, reaching quite round the equatorial belt and possessing considerable homogeneity of

form and habit, having mostly long pendant fronds, linear or strap-shaped which grow in tufts on the branches of trees or on rocks, in shady places or forests.

Fronde  $\frac{1}{8}$  inch wide or less.

1. *V. intramarginalis*.
2. *V. lineata*.

Fronde  $\frac{1}{4}$ – $\frac{1}{2}$  inch wide.

3. *V. stipitata*.
4. *V. remota*.

1. *V. intramarginalis*, BAKER.—*Rootstock* horizontal, very shortly repent, densely clothed with hair-like reticulated serrated scales. *Fronde* more or less tufted, few or many, the barren broader, rounded at the top, linear, 2–6 in. l., a line to  $\frac{1}{8}$  in. w., narrowed and thickened toward the base with no distinct, unmarginated petioles, tapering and acute or acuminate at the apex; back rather rounded with a distinct narrow depression down the centre dark-green; under side much paler, the margins thin. *Sori* sunk in continuous (or rarely interrupted) grooves which fall short of both apex and base of the fronds. *Veins* distant, forming long narrow areolæ. *Journal of Botany* 1877, p. 266.

Jamaica; on branches of trees on the banks and overhanging Ginger river, St. Mary, and near Bath, St. Thomas in the East. A small plant which much resembles young plants of the next species, from which it is readily distinguishable by the distinct small barren fronds (not however present in full grown plants,) less coriaceous and more pliant texture, pale under surface, thin margins and distinctly intramarginal open slits containing the sori. There is no distinct midrib, the central vein being not stronger than the lateral ones, with a line of narrow longitudinal areolæ on each side of it. The grooves are medial, open and rounded with thin edges where the fronds are dried and the surface wrinkled longitudinally.—Endemic.

2. *V. lineata*, SWARTZ.—*Rootstock* shortly repent fasciculate, densely clothed with dark hair-like reticulated serrate scales. *Fronde* linear 1–4 ft. l.  $\frac{1}{8}$  in w., uniform pendent in dense compact tufts, narrowed gradually and thickened at the base, but with no distinct stipes, glossy deep green thickly coriaceous, but pliant while green, openly depressed down the back, the under side rounded toward the base, margins as thick but the edges subrounded both above and beneath. *Veins* slender immersed and concealed, oblique distant forming narrow longitudinal areolæ. *Sori* sunk in a thread-like very narrow uninterrupted groove close to the margins. *Pl. Fil.* t. 143, Eatons Ferns N. Am. pl. 38.

Jamaica; very common on trees, especially on the banks of rivers at low altitudes, and on rocks and trees, in forests from sea level up to almost the very highest elevations. Specimens from the mountain forests are dwarf and often not over a foot long. The finest plants grown on the branches of trees that overhang rivers among the lower hills, these are horse-tail like, in dense pendent tufts, 2–4 ft. l., the grooves are narrower, and nearer the edge than in the last species, the substance thicker, and the margins not reduced, the corners being merely rounded.—West Indies, and widely dispersed throughout Tropics East and West.

3. *V. stipitata*, KUNZE.—*Rootstock* subrepent, very short, clothed with minute hair-like dark reticulated scales. *Stipites* tufted, naked or slightly scaly, dark purple, 1–3 in. l., passing gradually into the dark green fronds, which are linear ligulate, pendent, 1–3½ ft. l., ¼–⅜ in. w., firm but pliant while fresh very clear and translucent, the margins slightly thickened, the edge on the under side not rounded. *Veins* immersed very oblique, long forming, very narrow, greatly elongated areolæ. *Sori* submarginal, sunk in a narrow continuous thread-like groove, falling short at the base and apex.

Jamaica; infrequent on the branches of trees over rivers, and in very wet forests, chiefly among the lower hills, but ascending as high as 4,000 ft. altitude. Most frequent on the banks of Ginger river, St. Mary; gathered also at Old England, below the Government Cinchona Plantation. It grows chiefly in peaty matter, which accumulates about the roots of Bromeliads, and on decaying wood. There are only a few fronds to a single tuft, but the plants are generally aggregated in a mass. In growth the fronds are exceedingly translucent, so much so that the venation can be clearly seen at a distance in favourable light; the lateral veins are nearly as strong as the mid-vein there being no distinct mid-rib, above the base of the frond as in the preceding species.—Colombia to Peru.

4. *V. remota*, FÊE.—*Rootstock* slender short, erect, the scales very minute reticulated, and dark. *Stipites* caespitose erect, few to a plant, purple, short, winged by the decurrent fronds to near the base. *Fronde*s erect or sub-erect ¾–1¼ ft. l., ¼–½ in. w., tapering gradually both ways the apex acuminate very rarely forked; pellucid chartaceous a bright glossy green, paler beneath. Margins thin and slightly reflexed or bevelled, sometimes irregularly narrowed and forming a shallow notch in the line, mid-rib evident, raised on the upper side, the base dark purple. *Veins* close, about 1 l. apart, connected exteriorly within the margin and also casually interiorly. *Sori* forming a dark brown band superficial, or the receptacle very slightly depressed continuous or interrupted.

Jamaica; rare in forests on decaying logs of wood, growing in grass-like masses. Gathered at Chesterfield St. Mary, a well marked but rather anomalous species; distinguished by the superficial broadish bands of sori, the close veins, which casually form medial connections as well as the normal exterior anastomosis and the distinct mid-rib, the veins though immersed, as is also the mid-rib, are slightly raised on the upper side; the texture while fresh is pellucid, and the colour very fresh bright and green.—West Indies to Ecuador.

#### GENUS XXXIX.—TÆNITIS, Swartz.

*Sori* linear, continuous or interrupted, rarely in oblong patches, sub-marginal, intramarginal, or medial superficial or more or less impressed or sunk in a narrow furrow. *Veins* freely reticulated, or the veinlets connected by a transverse longitudinal vein, which forms a linear or elongated receptacle. *Fronde*s simple furcate or pinnate, generally coriaceous, naked or slightly scaly. *Rootstock* repent or free creeping.

A very small genus much resembling the preceding but distinguished by its more superficial sori, generally copiously reticulated venation stiffer, and coriaceous texture, and erect or less pendent habit. There are barely a dozen

species all tropical, two-thirds of which are American, and the other Asiatic. They are all epiphytal growing on the branches and stems of trees, mostly in moist districts or situations.

Fronde simple.

1. *T. Swartzii*.
2. *T. angustifolia*.
3. *T. lanceolata*.

Fronde furcate or pinnatifid.

4. *T. furcata*.

1. *T. Swartzii*, JENMAN.—*Rootstock* free creeping, thick as slender cord, dark tomentose, scaly in the extending part. *Fronde* scattered 4-6 in. l.,  $\frac{1}{4}$ - $\frac{1}{2}$  in. or more wide, acuminate tapering at the base, and decurrent on the short purple petioles, which are  $\frac{1}{2}$ -1 $\frac{1}{2}$  in. l., elastico-coriaceous opaque thickly sprinkled with minute pellate fimbriate edged scales, under side paler than the upper, costa purple thread-like upwards. *Veins* immersed hidden or obscure, reticulated, the areolæ elongated and parallel with the costa and margins. *Sori* superficial intramarginal, mostly in oblong patches in small fronds confined to the upper part. *Grammitis elongata*, Swartz, *Mecosorus* Klotzch, *Gymnogramma*, Hook., *Polypodium*, Mett.

Jamaica: common below 2,000 or 3,000 ft. altitude growing on the stems of bushes and trees, generally near the ground. The fructification is very variable, ranging from patches a quarter of an inch to unbroken lines two or three inches long. The fronds with the longer lines of sori no one would, on first knowledge, think of referring to any of the genera above quoted, and therefore I think the species is best associated with *Tanitis*. Indeed narrow soriferous fronds might very readily be taken for branches of *T. furcata*, Wild. —Trinidad and West Indies generally, Tropical South America.

2. *T. angustifolia*, R. BR.—*Rootstock* rather slender, repent, densely clothed with dark reticulated hair-like lacerate edged, acuminate scales. *Fronde* linear lanceolate suberect or pendent, approximate or rather tufted often 1-1 $\frac{1}{2}$  ft. l.,  $\frac{1}{2}$  in. or rather over, wide; long tapering to the very acuminate apex, the same to the long-decurrent base in which the petiole is hardly distinct, coriaceous, naked, the upper side darker, the margins entire, even, thin and rather reflexed, sometimes concealing the sori, the mid-rib evident beneath, purple in the lower part. *Veins* immersed, copiously reticulated in elongated areolæ, which run parallel with the costa and margins. *Sori* continuous or interrupted, slightly within the margin, in a shallow or rather superficial groove falling short of both apex and base. Pl. Fil. t. 140, *Pteropsis*, Desv.

Jamaica; frequent on the branches of trees close to rivers below about 2,000 ft. altitude. As in some of the species of *Vittaria* and other similar epiphytal ferns which grow without soil or vegetable matter, the roots are densely tomentose. The fronds resemble most those of *Vittaria remota* but are longer, more opaque, and may at once be distinguished by the netted venation, which, however, is often quite concealed in the leathery opaque substance. In a young state the thin reflexed margins or outer edges of the grooves more or less conceal the lines of sori but at maturity they alter and expose and form dark submarginal bands. —West Indies and Tropical America.



3. *T. lanceolata*, R. BR.—*Rootstock* shortly repent, with dense much matted rootfibre. *Stipites* approximate or apart, chestnut brown, 1–2 in. l., erect. *Fronde* erect lanceolate,  $\frac{1}{2}$ – $1\frac{1}{4}$  ft. l.,  $\frac{3}{4}$ – $1\frac{1}{4}$  in. w., tapering both ways, upwards to a long somewhat contracted fertile part, the base decurrent shortly more on one side than the other, coriaceous stiff naked, glossy dark green, distinct, the same colour as the frond. *Veins* freely reticulated forming oblique meshes with free included veinlets. *Sori* marginal confined to the upper part of the fronds in continuous or interrupted marginal lines, superficial, or very slightly impressed at first. Pl. Fil. t. 132, *Neurodium*, Fée, *Pteris lanceolatum*, Linn., Desv., *Paltonium*, Presl.

Frequent on trees at low elevations, growing in erect spreading patches, with densely matted roots. A broader, stiffer and more lanceolate species than the last, and marked by the bands of sori being more marginal and confined to the rather contracted upper third on less of the fronds, and by the different venation which has rather stronger main veins at intervals, and free included veinlets in the meshes. The venation shows distinctly on the upper side. The margins are so repand that when dry they are quite wavy.—Common.

4. *T. furcata*, Willd.—*Rootstock* small, shortly elongated, densely clothed with minute dark brown reticulate scales and tomentum. *Stipites* erect, or spreading, tufted or subtufted from hardly any (clear of the decurrent rings of the frond) to 1 in. l., dark or purplish, slightly scaly, puberulous or naked. *Fronde* variable, elastico-chartaceous grey green, especially the mid-rib, which is freely sprinkled over with very minute dark coloured peltate scales; 4–12 in. l., 3–8 in. b., dichotomously forked or regularly pinnatifid, the base tapering in the form of narrow wings to the rachis 2–4 in. l. *Pinnæ* linear spreading obliquely, acute or acuminate, 2–6 in. l., 2 li. w., the base decurrent, forming an interrupted wing to the rachis, the same width as the pinnæ, margin even. *Rachis* and costæ raised exposed and purple beneath, above, covered by the parenchyma, slender. *Veins* rather distant, oblique, the ends carried forward and uniting within the margin forming a single line of costal areolæ, parallel with the margin, the connected ends of the veins making a receptacle for the depressed or superficial linear continuous or interrupted dark brown sori on the outer part of the segments. Syn. Fil. p. 397, Gr. Fl. B.W.I. p. 671, *Pteris*, Linn., *Cuspidaria*, Fée., *Dicranoglossum*, J. Sm.

Trinidad and Guiana; frequent in the latter country on branches of low trees on sand ridges; growing in tufts with matted tomentose roots without soil. The fronds vary from dichotomously furcate or digitate to pinnatifid, with obliquely spreading regular pinnæ, and the sori from oblong and interrupted to linear and continuous. The length of the tapering petiole-like base of the frond is equally variable. The larger pinnatifid state is *Cuspidaria sub-pinnatifida* Fée, that with interrupted short sori is var. *polypodioides*, Hook. The lines of sori from intramarginal ridges as prominent as the costa along the upper surface.—Cuba, Panama, Venezuela and Brazil.

A note by Jenman in *Trinidad Herb.* on larger form says “This large form is that figured by Plumier on which Willdenow based the name.” In this form the pinnæ are 6–8 l. w.—ED.

TRIBE XIV.—ACROSTICHEÆ.

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*Fronde*s usually dimorphous, covering a wide range in form, cutting and habit, the fertile more or less contracted. *Sori* usually diffused over the whole under surface (and occasionally the upper) except on the rachis and costæ. *Sporangia* stalked, compressed girdled by a vertical pointed band splitting transversely when ripe, usually naked, and destitute of any involueral covering.

This tribe as here viewed and represented in this flora, comprises only a single large genus, in which, regardless of diversity of habit venation and circumscription, which characters authors have adopted for dividing it into several genera—are included all those plants which have naked amorphous sori, and though confessedly an heretogeneous assemblage, the character is an obvious and easily recognized one. They are principally tropical subjects and have their head quarters on the islands and mainland of equatorial America, where about two-thirds of the known species exist.

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GENUS XL.—ACROSTICHUM, Linn.

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*Sori* diffused in a uniformly even superficial layer over the under, and in a few cases the upper surface of the frond. Sterile and fertile fronds except in one case distinct, the latter usually more or less contracted. *Venation* free or scariously anastomosing, habit and circumscription various.

This well marked genus embraces about 200 species, the majority of which are epiphytal subjects, living among moss and vegetable debris on trees rocks and decaying logs in damp forests, and of the rest, the majority lift themselves clear of the ground, where they begin their growth and ascend the nearest vertical surface by means of their creeping or scandent rhizomes so that very few are strictly terrestrial. The barren fronds are permanent, usually for years, but the fertile which are produced only in season and are herbaceous or membranous in substance, mature and perish in a few weeks; some species only fruit during a limited portion of the year, generally in the late summer months.

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Fronde simple.—Sp. 1-45.

Veins free.—Sp. 1-44.

Fronde nearly or quite naked.—Sp. 1-19.

Fronde tapering at the base.—Sp. 1-12.

Stipites of barren fronds usually under 1-2 in. l.—Sp. 1-5.

1. *A. Fééi*.
2. *A. nigrescens*.
3. *A. flaccidum*.
4. *A. Herminieri*.
5. *A. stenopteris*.

Stipites of barren fronds usually over 2 in. l.—Sp. 6-12.

6. *A. gramineum*.
7. *A. simplex*.
8. *A. inæqualifolium*.
9. *A. alatum*.
10. *A. viridifolium*.
11. *A. chartaceum*.
12. *A. schilimense*.

Fronds shortly tapering, cuneate or rounded at the base.—  
Sp. 13-19.

- 13. *A. pallidum*.
- 14. *A. lingua*.
- 15. *A. conforme*.
- 16. *A. leptophlebium*.
- 17. *A. Burchellii*.
- 18. *A. latifolium*.
- 19. *A. luridum*.

Fronds more or less paleaceous.—Sp. 20-32.

Scales few.—Sp. 20-22.

- 20. *A. Sherringii*.
- 21. *A. vicosum*.
- 22. *A. Huacsaro*.

Scales copious but not matted.—Sp. 23-26.

- 23. *A. tectum*.
- 24. *A. laminarioides*.
- 25. *A. magnum*.
- 26. *A. auricomum*.

Scales matted.—Sp. 27-32.

- 27. *A. muscosum*.
- 28. *A. cuspidatum*.
- 29. *A. perelegans*.
- 30. *A. lepidotum*.
- 31. *A. Engelii*.
- 32. *A. squamosum*.

Scales chiefly on the margins and mid-rib, paleaceous or hair-like.—33-36.

Scales paleaceous.—Sp. 33.

- 33. *A. decoratum*.

Scales more hair-like than paleaceous more or less deciduous.—  
Sp. 34-36.

- 34. *A. hybridum*.
- 35. *A. scolopendrifolium*.
- 36. *A. Boryanum*.

Scales hair-like, confined chiefly to the margins and rib, or spread over surface.—Sp. 37-44.

Scales chiefly on the margins but sparingly over the other surface.—Sp. 37-39.

- 37. *A. apodum*.
- 38. *A. Raywaense*.
- 39. *A. cubense*.

Scales spread more freely over the surface.—Sp. 40-44.

- 40. *A. spathulatum*.
- 41. *A. Ambertii*.
- 42. *A. Lindeni*.
- 43. *A. siliquoides*.
- 44. *A. villosum*.

Veins areolated.—Sp. 45,

Scales hair-like scattered over the surface.—Sp. 45

45. *A. crinitum*.

Fronds compound.—Sp. 46–59.

Veins free.—Sp. 46–51.

Fronds palmate or flabellate.—Sp. 46.

46. *A. peltatum*.

Fronds simply pinnate.—Sp. 47.

47. *A. sorbifolium*.

Fronds bi-tripinnate.—Sp. 48–50.

48. *A. acuminatum*.

49. *A. caudatum*.

50. *A. omundaceum*.

Veins united.—Sp. 51–59.

Veins united only at the margin. - Sp. 51.

51. *A. cervinum*.

Veins copiously areolated.—Sp. 52–59.

Sporangia not mixed with corpuscles.—Sp. 52–57.

52. *A. Fendleri*.

53. *A. nicotianæfolium*.

54. *A. alienum*.

55. *A. praestantissimum*.

56. *A. serratifolium*.

57. *A. Raddianum*.

Sporangia mixed with corpuscles.—Sp. 58–59.

58. *A. aureum*.

59. *A. lomariodes*.

*Non numero A. Cænopteris*, Kze.—*See* note p.

1. *A. Feei*, BORY.—*Rootstock* very slender filiform, wide-creeping, clothed with bright brown or ferruginous fine acuminate scales. *Stipites* scattered,  $\frac{1}{2}$ – $1\frac{1}{2}$  in. l., slightly scaly. *Fronde*s linear or oblong-lanceolate, 1–3 in. l.,  $\frac{1}{4}$  in. b., the apex blunt, the base cuneate, subcoriaceous bright green, with a few small scattered scales on the surface and mid-rib: margins sub-serrate; *veins* oblique, once forked, open, the ends not cutting the margins; fertile *fronds* smaller on longer stipites.—Syn. Fil., p. 404. Hook. 2nd Cent. Fer. t 92.

Dominica, Mount Couliabou, gathered by Dr. Inray. In a genus where many of the species run very close to each other, this is a very distinct type. It has the habit and somewhat the aspect of *Polypodium pilloselloides*, of which it reminds one, both in the form and size of the fronds and in the character of the rootstock.—Guadeloupe, Andes of Quito, S. America.

2. *A. nigrescens*, HOOK.—*Rootstock* strong erect, devoid of scales; *Stipites* tufted, erect, very short or never clear of the decurrent membrane. *Fronde*s erect, 6–9 in. l.,  $\frac{1}{2}$  in. or over br., gradually tapering to the base, the apex blunt or acute; coriaceous, naked, dark-green: margins even; *Veins* open spreading, simple or forked with thickened apices, not entering the margin—fertile fronds 2–3 in. l.,  $\frac{1}{4}$  in. br., blunt or obtuse, the base tapering, the petioles slender and 8–12 in. l.—Syn. Fil., p. 400.

Guiana, Schomburgh, gathered at Roraima. A small peculiar species, apparently gathered only by the Schomburgh brothers 40 years ago, marked by its small size, the nearly sessile barren fronds, and much smaller, but very long petioled fertile ones, which far overtop them.—Endemic.

3. *A. flaccidum*, FEE.—*Rootstock* shortly repent, upright or oblique, densely clothed with fine acuminate dark brown scales. *Stipites* tufted, hardly distinct,  $\frac{1}{4}$ – $\frac{3}{4}$  in. l., scaly. *Fronde*s erect, linear-lanceolate, very acuminate, long tapering to the winged base, 6–12 in. l., 1– $1\frac{1}{2}$  in. b., chartaceous pellucid, light green, glabrous or slightly scaly on the rachis with minute speck-like scales sprinkled over the under surface. *Veins* patent, evident, close, simple or forked terminating at the cartilaginous edge of the even or somewhat repand margins, fertile fronds much reduced on slender slight paleaceous stipites, 2–4 in. l.—Syn. Fil., p. 401.

St. Lucia, Trinidad, and Guiana; common all through the lower forest region of the latter country, and probably the commonest species within its range in the country. Marked by its thin texture, nearly sessile sterile fronds, much smaller fertile ones on comparatively long stipes.—Guadeloupe, and Panama, to Brazil.

4. *A. Herminieri*, BORY.—*Rootstock* short, densely clothed with matted linear or filiform, undulate, bright ferruginous scales, which are a third to 1 in. l., and  $\frac{1}{4}$  li. w. *Fronde*s scimitar shaped, tufted or sub-tufted, several, quite pendent, tapering and long decurrent at the base to stipites an inch or less l., tapering and acuminate at the apex  $1\frac{1}{2}$ –3 ft. l.,  $\frac{3}{4}$ –1 in. w. Very coriaceous, dark glossy green, paler beneath, glabrous but with scattered minute speck-like scales beneath while young; mid-rib immersed in the parenchyma. *Veins* close,

forked, immersed, evident above, less so, or concealed beneath, fertile fronds 4-5 in. l.,  $1\frac{1}{4}$ - $1\frac{1}{2}$  in. w., lanceolate or lanceolate oblong, shortly pointed, the base cuneate, petiole about 1 in. l.

Jamaica: infrequent on trees in forest of the eastern parishes, gathered in 1886 by Mr. Sherring above Bath at 4,000 feet altitude. A peculiar and very striking species, distinguished by the very long narrow sterile fronds, often over a yard long, and not exceeding an inch wide, and the very disproportional short but rather broader fertile ones, that rarely exceed six inches long; though very coriaceous, the fronds which curve laterally through one margin being shorter than the other thus acquiring the scimitar shape are not so rigid as in some of the other species. The rootstock is short, repent or sub-repent, descending and quite concealed in the copious tuft of long dense glossy scales.—Trinidad.

5. *A. stenopteris*, KLOTZSCH.—*Rootstock* as thick as a quill, elongated ascending, freely clothed with brown linear-acuminate small scales. *Stipites* tufted, an inch or two long, pale brown, scaly mostly so at the base. *Fronde*s linear lanceolate, erect  $1\frac{1}{4}$ - $1\frac{1}{2}$  ft. l.,  $\frac{3}{4}$ - $\frac{7}{8}$  in. w., tapering both up and down, the base decurrent as wings to the top of the stipes, thickly chartaceous, very pellucid, pale, green glabrous, the margins in the upper part crenate-serrate: *Rachis* light brown, prominent beneath at the base with a few scattered deciduous small brown scales. *Veins* open simple or forked, oblique about 1 li. apart terminating in clavate apices within the margins; fertile fronds the same shape, but smaller, and on three or four times longer stipites.—Syn. Fil., p. 402.

Guiana, in Thurn, n. 267, on the slope ascending to the base of Roraima marked by the long narrow very thin textured fronds long decurrent at the base to a petiole about 1 inch l. clear of membrane, the open veins with thickened pellucid apices, finally having a dark spot over them and the crenate margin which becomes conspicuous in the outer part of the frond.—Columbia and Venezuela.

6. *A. gramineum*, JENMAN.—*Rootstock* slender, creeping, naked, bent, viscid. *Stipites* scattered but approximate, slender, 2-3 in. l., winged in the upper part by decurrent sides of the fronds, naked. *Fronde*s numerous, erect or oblique, forming spreading grass-like patches, linear  $2\frac{1}{2}$ -5 in. l., 3-4 li. w., tapering equally at the apex and base, or more at the latter, chartaceous, pellucid, naked, glossy bright green, viscid throughout. *Veins* rather close, simple and forked, terminating within the margins, in clavate apices: fertile fronds smaller the same shape on longer stipites.—Journal Botany, Vol. 8, new series, p. 263.

Jamaica; common, on banks and rocks at 2,000 ft. altitude. Gathered near Second-breakfast Spring, beyond Mount Moses, St. Andrew. A smaller and much thinner textured plant than the next, naked in all its parts, very viscid, which, however, only shows when pressed in paper to dry, and forming large patches, in substance quite distinct from all the rest of this section.—Endemic.

7. *A. simplex*, SWARTZ.—*Rootstock* slender, short-creeping, clothed with dark lanceolate, acuminate scales. *Stipites* erect, contiguous, 2-3 in. l., slightly scaly at the base. *Fronde*s linear-lanceolate, erect, tapering equally at both ends, acuminate, the base decurrent on the petioles  $\frac{1}{2}$ -1 ft. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. w., coriaceous and stiff, naked, the upper side glossy, dark green under paler, the margins reflexed when dry, the rachis prominent beneath. *Veins* obscure, close,

simple or forked, fertile fronds usually somewhat smaller, though as broad, acute at the apex, the stipites rather longer.—Hook. Gen. t. 105.

(A.).—*A. martinicense*, DESV.—*Fronds* linear 10–15 in. l., 2–4 or 6 l. w. Very numerous: rootstock more slender, upper surface with a bluish tinge under pale, and at first sprinkled with a few minute appressed scales, fertile fronds shorter and broader. Hist. Acrost., p. 45, t. 16. f. 3.

Jamaica; on decaying logs in forests and coffee plantations at 2,000–4,000 feet altitude. This is not nearly so abundant as the following allied species from which it is distinguished by its narrow-linear-lanceolate fronds.

A. occupies the trunks and branches of growing trees, chiefly in moist forests up to 4,000 feet altitude, and is much more common, though equally coriaceous it is usually pendent or much curved in habit, and the rootstock interlaces, forming patches as large or larger than an open hand with numerous densely aggregated fronds.—Cuba to Brazil.

8. *A. inæqualifolium*, JENM.—*Rootstock* free creeping, cylindrical, thick as a quill horizontal, densely clothed with chestnut coloured pale-margined palææ. *Stipites*, scattered, erect, 2–3 or 4 in. l., rather freely clothed at first with spreading scattered brown scales, subsequently naked. *Fronds* stiffly erect, linear-lanceolate, very acuminate, tapering equally to the apex and base, 4–10 in. l.,  $\frac{1}{3}$ – $1\frac{1}{4}$  in. w., coriaceous, dark bright green, paler beneath, dotted with scattered very minute fimbriate pale-edged scales, which are paler, less abundant and more fibrillose on the upper surface. *Margins* cartilaginous-edged and rather reflexed when dry. *Veins* fine, forked from base, close, obscure; fertile fronds conform, but on stipites which are more or less distinctly scaly usually twice as long as the barren.—Journ. Bot., 1886, p. 273.

Jamaica; frequent in high mountain forests on logs and decaying vegetable matter. Like *chartaceum* (with which it grows) in colour, but uniformly smaller, much stiffer and coriaceous, the minute scales of the surface more fibrillose and paler, the petioles freely paleaceous at first, the fertile ones always so while the fronds are fresh, and twice the length of the barren, and with a slender free creeping horizontal rootstock several inches long, dark coloured and with a double series of the bases of past stipites  $\frac{1}{2}$ – $\frac{3}{4}$  in. l. on the upper side.—Endemic.

9. *A. alatum*, FÉE —*Rootstock* shortly repent, freely clothed with dark or ferruginous reticulated free acuminate scales. *Stipites* approximate or sub-tufted, erect,  $1\frac{1}{2}$ –4 in. l., slightly scaly or naked. *Fronds* erect, oblong-lanceolate. or lanceolate-acuminate, the base decurrent as wings to the upper part of the stipites, sub-coriaceous dark green, glabrous, 3–7 in. l.,  $1\frac{1}{2}$ –2 in. w., glabrous or sprinkled beneath with very minute scales. *Veins* patent,  $\frac{1}{3}$ –1 li. apart simple and forked, evident. Fertile fronds much reduced, less decurrent, on much longer slender stipites over-topping the sterile.—Fée, Fil. Ant. p. 2.

Jamaica; infrequent in mountain forests of St. Andrew at 2,000–3,000 feet altitude. Differs from *A. conforme* and other allied species by the decurrent base of the fronds, which wings with membrane the upper part of the petioles, and by the smaller long petioled fertile fronds, which are projected quite above the top of the sterile ones.—West Indies and Tropical America.

10. *A. viridifolium*, JENM.—*Rootstock* short, rather stout, oblique or decumbent, densely clothed with small ferrugineous linear scales. *Stipites* sub-tufted, erect, stramineous, 1–3 in. l., channelled. *Fronde* linear-lanceolate, 7–9 in. l., 1–1 $\frac{1}{3}$  in. w., tapering both up and down, but more downward, and passing insensibly into the petiole, the apex pointed but obtuse, glabrous but with laxly scattered with very minute peltate scales over the under side; coriaceous bright green, margins even or repand. *Veins* fine, close, once forked, nearly concealed, fertile fronds much narrower, nearly or quite as long, on stipites, twice as long.—*Journ. Bot.* 1886, p. 273.

Jamaica; this comes nearest to *A. flaccidum* Fée, but is distinguished by its longer petioles, coriaceous texture, finer, and closer venation, and the obtuse pointed fronds. The petioles are slightly scaly at first, but early become quite naked. The midrib is prominent beneath, channelled above, and with the petioles straw coloured when dry.—Endemic.

11. *A. chartaceum*, BAKER.—*Rootstock* shortly repent or erect, freely clothed with bright dark brown or castaneous paleæ. *Stipites* tufted, or sub-tufted erect, 2–6 in. l.; bearing at first a few scattered brown scales. *Fronde* linear-lanceolate, acuminate, much tapering at the base,  $\frac{1}{2}$ –1 $\frac{1}{4}$  ft. l., 1–2 in. w., chartaceous or sub-coriaceous, naked or sprinkled with minute punctiform brown scales over the paler under surface: the upper a glossy dark rather metallic green. *Rachis* distinct on both sides, slightly channelled above. *Veins* usually evident on the surface 1–3 times dichotomously forked,  $\frac{3}{4}$ –1 li. apart, fertile fronds narrower, as long or not, sometimes longer, on stipites of equal length, with those of the barren, or longer.—*Journ. Bot.*, 1882, p. 327.

Jamaica; very plentiful in forests at 5,000, 6,000, ft. altitude on decaying logs and other substance on the ground. This was first ascribed to *A. Sartorii*, Lieb., from which it appears to be distinct. In shape of frond it resembles *A. flaccidum*, Fée, with which Jamaica specimens have before been placed, but its larger size, much longer petioles and dark nearly metallic green colour and different habit quite distinguish it. The much-tapered sides of the fronds often somewhat expand at the very base; near the margin the veins occasionally and casually unite. From *latifolium* it differs in texture, colour and shape.—Endemic.

12. *A. Schlimense*, FÉE.—*Rootstock* free creeping, woody, densely clothed with broadish brown paleæ. *Stipites* apart, 4–8 in. l., erect, brown, paleaceous at the base. *Fronde*  $\frac{3}{4}$ –1 ft. or more l., 1 $\frac{1}{4}$ –1 $\frac{1}{2}$  in. w., erect, subcoriaceous, dark green glabrous, on the midrib sprinkled over with minute dark scales; acute or bluntish tapering gradually downwards in the lower half and decurrent, the margins even or repand and cartilagineous edged. *Veins* spreading simple and forked, fine, close, fertile fronds similar but reduced.—*Syn. Fil.* p. 402.

Guiana; Schomburgh, im Thurn n. 229, Roraima. Intermediate in character and habit, between *flaccidum* and its allies and some of the forms of *latifolium*, with a free spreading rootstock.—New Grenada and Ecuador.

13. *A. pallidum*, BAKER.—*Rootstock* woody, very stout, cylindrical, elongated, densely clothed with loose undulated, narrow, glossy, dark-coloured scales,  $\frac{1}{4}$ – $\frac{1}{2}$  in. l. *Stipites* numerous, cæspitose, rather slender, 5–10 in. l., scaly at the base. *Fronde* pendant or



spreading, oblong-lanceolate,  $\frac{1}{2}$ – $1\frac{1}{4}$  ft. l.,  $1\frac{1}{4}$ – $2\frac{1}{2}$  in. w., the apex acuminate, the base rounded, or in the smaller states cuneate, coriaceous, but pellucid, naked, pale green, the margins repand, cartilaginous edged. *Veins* forked,  $\frac{1}{2}$ –1 li. apart the base dark coloured: fertile fronds smaller, the same shape on rather longer stipites.—*Journal Botany* Vol. 8, new series p. 263.

Jamaica; abundant on open banks, near the Government Cinchona plantation at 5,000 ft. altitude. The rootstock is an inch thick, increasing in diameter as it elongates, erect or oblique (not at all repent) and densely clothed with linear crispate or undulate almost blackish scales, with the fronds caespitose at the apex. The fronds are as many as 1–2 dozen to a plant though fewer, also, in numerous instances. The larger ones are subordinate at the base. The colour is unusually pale.—Endemic.

14. *A. Lingua*, RADD.—*Rootstock* slender, wide creeping, scales sparse, or more plentiful, more or less deciduous. *Stipites* scattered, 3–5 in l., scaly at the base and slightly upwards, wood brown, articulated, margined in the upper part. *Fronds* 5–8 in. l.,  $1\frac{1}{2}$ –2 in. w., the upper part tapering and acuminate, the lower part tapering or cuneate and decurrent, coriaceous, bright-green, naked, or with a few very minute, point like scales sprinkled over the underside. *Margins* even or somewhat repand cartilaginous-edged. *Veins* patent close, forked and simple, fertile fronds narrow on similar stipites. Syn. Fil. p. 402.

St. Lucia; gathered recently by Gray. Guiana, on trees in forests near the Kaitere Savannah, Potaro River im-Thurn, 233 and 238 Roraima. Best distinguished by its freely or wide-creeping rootstock. *A. scandens* Fée., Fil., Ant. t. 1 fig. 1, has similar fronds, with a similar rootstock, the vestiture of which however is represented in the figure as consisting of fine hairs while in this they are flat and appressed.—Guadeloupe, Mexico to Brazil.

15. *A. conforme*, SWARTZ.—*Rootstock* short-creeping, rather woody, densely clothed with bright tawny scales. *Stipites* approximate, 2–6 in l., straw coloured, nearly or quite naked, except at the very base, narrowly margined at the top. *Fronds* variable in size, 3–6 or more in. l.,  $\frac{3}{4}$ – $1\frac{1}{4}$  in. w., lanceolate or oblong-lanceolate, erect acute-pointed, the base cuneate: very coriaceous and stiff, naked, pale green generally: the rachis raised beneath. *Veins* close, simple and forked: fertile fronds usually somewhat smaller, sub-rounded or less cuneate at the base, the stipites rather longer.—Swtz. Syn. t. 1, fig. 1.

Jamaica: common on decaying logs in forests, and coffee plantations from 2,000 feet altitude upwards. Smaller and stiffer than *latifolium* which in texture and shape it most nearly resembles. It varies in size with the position in which it is found. Some of my specimens, which are fully fertile, from exposed situations are only 2 in. l. in the fronds.—West Indies and Tropical America. Widely distributed in Eastern tropics and Australasia.

16. *A. leptophlebium*, BAKER—*Rootstock* free creeping, but erect, as thick as a quill freely clothed with rather fine acuminate squarrose scales. *Stipites* slender springing from all sides of the rootstocks;  $\frac{1}{2}$ –1 in. apart erect, 8 in. l., pale dull straw colour, slightly scaly, channelled. *Fronds* 1– $1\frac{1}{4}$  ft. l.,  $1\frac{1}{2}$ – $1\frac{3}{4}$  in. w., acuminate, the base shortly cuneate: margins repand and rather sinuate, light green, thickly chartaceous, very pellucid, clothed with fine scattered minute scales, sprinkled on both sides, and also especially along

the pale slender rachis; *Veins* spreading quite 1 li. apart, simple and forked, terminating within the margin in thickened apices; fertile fronds  $4\frac{1}{2}$  in. l., 1 in. w., blunt at the top, broadened downwards, the base rounded on a stronger stipe  $1\frac{1}{4}$ - $1\frac{1}{2}$  ft. l., a few very minute black scales sprinkled sparsely over it throughout.—Baker in Trans. Linnean Soc. Ser. 2 Bot., Vol. II, Part 13.

Guiana, in Thurn, n. 237. Gathered on the upper slope of Roraima, a pale thin plant, very pellucid, with open veins fully a line apart, conspicuous in the thin translucent substance, and slender ascending rootstock. The stipites are rather fragile, those of the fertile fronds far outreaching the barren. The two kinds of fronds differ in shape, the fertile which are much the smaller, being lanceolate-oblong, while the barren are more linear-oblong. The termination of the veins in the latter is marked by a series of dark dots along just within the edge of the margin.—Endemic.

17. *A. Burchelli*, BAKER.—*Rootstock* short, woody, repent, or erect, densely clothed with linear-acuminate brown reticulated scales. *Stipites* erect, sub-tufted, brown or stramineous, 6 in. l., deciduously scaly to the top. *Fronds* erect, 10-12 in. l., 2- $2\frac{1}{2}$  in. w., acuminate, the base cuneate, sub-coriaceous, bright green, glabrous above, minute small stellate scattered brown scales beneath, midrib stramineous or brown, margins even or more often repand, thin and cartilagineous edged. *Veins* patent, close, simple and forked, fertile fronds 6-9 in. l.,  $1\frac{1}{2}$  in. w. on stipites of equal length over-reaching the barren. Syn. Fil. p. 401.

Guiana; gathered on trees and banks in the forest near the Kaiteur Savannah. Resembling *A. latifolium*, but of thinner texture, the fronds more pointed or tapering, especially the fertile, at apex and base, and with more slender stipites the fronds drying a straw-green.—Brazil.

18. *A. latifolium*, SWARTZ.—*Rootstock* usually short, creeping, woody, densely clothed with glossy bright or dark coloured scales. *Stipites*, few contiguous, or an inch or two apart, strong  $\frac{1}{2}$ -1 ft. l., brown or stramineous slightly channelled, naked except at the scaly base. *Fronds* naked, very coriaceous bright-green 1-2 ft. l., 2-4 in. w., tapering equally at both ends, the margins thin, and rachis strong, and prominent beneath. *Veins* very close, mostly forked from the base; fertile fronds smaller, more rounded at the base, the stipites as long or rather longer. Var. (a) *A. crassinervum*, *Fronds* several smaller, deeply and freely undulated.

Jamaica; plentiful in forests chiefly on decaying logs and trees from 1,000 ft. altitude upwards, but most abundant at the higher elevations. The habit of growth is erect or suberect but not straight and stiffy so, as in its near allies. This is the largest local species of the glabrous section, marked also by its long stipites. Pl. Fil. t. 135, *A. longifolium*, Jacq., *A. alismæfolium*, Eat.—West Indies and Central and S. America.

19. *A. luridum*, FÉE.—*Rootstock* strong, woody, very shortly repent, densely clothed with dark brown reticulated acuminate scales. *Stipites* tufted several, erect, strong, 2-4 in. l., more or less clothed to the top with deciduous filamentose scales, dark brown in age. *Fronds* lanceolate, or elliptical lanceolate, erect, very stiff and coriaceous, lurid green glabrous, or with scattered pointed-like specks beneath, 10-16 in. l., 3-5 in. w., acuminate, the base cuneate or shortly decurrent, midrib strong, margins even or repand, cartila-

ginously-edged. *Veins* patent, close forked and simple, immersed and inconspicuous; fertile fronds, 6-8 in. l., 2-2½ in. w. on petioles 5 in. l., Syn. Fil. p. 402.

*A. var. sub-glabrum*.—*Fronde*s smaller, the apex rounded or obtuse, surfaces ciliate in youth, specially around the margin.

Trinidad, Guiana; frequent on trees at the sand-hills and elsewhere, Demerara River. Differs from *A. latifolium* by the shorter scaly stipites sub-elliptical outline, thicker texture, and dark lurid green colour, the latter a conspicuous feature of wild plants. It is the stiffest species of all.

*A.* which is frequent in forests of the Demerara River, Guiana, agrees with Grisebach's description of *A. Schomburgkii*, Fée, which is ascribed as a synonym, to *luridum*.—Endemic.

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20. *A. Sherringii*, BAKER.—*Rootstock* shortly repent, fibrous; *Stipites* tufted, but not caespitose, 1-3 in. l., brown, nearly or quite naked, margined nearly to the base: *Fronde*s erect, papyraceous, very dark green, naked, pellucid, crenulate, repand, obtuse or obtusely acuminate decurrently cuneate at the base, mid-rib prominent beneath 6-9 in. l., ¾-1 in. w.; fertile fronds much smaller on stipites, 8 in. l., overtopping the barren: *Veins* open, simple or forked, curved, clavate within the margin.

Grenada, W. Indies; very near *A. viscosum*, but naked and not at all viscid.

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21. *A. viscosum*, SWARTZ.—*Rootstock* short-creeping, densely clothed with blackish very fine scales. *Stipites* numerous, crowded, lateral on the rootstock, slender, 3-6 in. l., very finely scaly throughout, light or dark brown. *Fronde*s linear-lanceolate, 1½-¾ in. w., acuminate or acute, the base tapering or cuneate, chartaceous or subcoriaceous, dark-green, lighter beneath, both viscid and sprinkled over with stellate minute scales, more densely clothed along the prominent dark-brown mid-rib beneath. *Veins* simple and forked, fertile fronds narrower on longer stipites.—Pl. Fil. t. 129, Hook. and Grev. Icon. Fil. t. 64.

Jamaica; very plentiful on open branches at 5,000 ft. altitude. St. Lucia, Dominica, St. Vincent. The stipites arise obliquely from the rootstock, along the upper side of which they are confused and are densely crowded. Those of the barren fronds are a darker brown and only half the length of the fertile. The surface is very glandulose and viscid, and the scattered minute lacerate or stellate scales, are greyish, on the mid-rib, denser. It differs from *Huacsaro* by the shorter rather broader, more lanceolate than ligulate acuminate fronds, stellate scales, more glandulose surface, as well as in the characters of the rootstock above described.—Cuba, Brazil and Tropical East.

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22. *A. Huacsaro*, Ruiz.—*Rootstock* elongated, clothed with small black scales and quite enclosed by the splint-like bases of the numerous stipites. *Stipites* slender, long-curved, at the base ¾-1 ft. l., light or dark brown channelled, more or less furnished throughout with minute scales. *Fronde*s numerous, linear-ligulate obtuse at the apex, much tapering at the base, ½-⅝ in. w., ¾-1¼ ft. l., subcoriaceous, more or less furnished with minute scales, chiefly along the rachis and their slightly reflexed margins beneath, glandulose very dark blackish-brown, the under side lighter. The rachis promi-

ment. *Veins* obscure, close, simple, or forked fertile fronds conform, but the stipites usually longer. *A. Calagula*, Kl. *A. Ruizianum*, Moore.

Jamaica; common at 5,000 ft. altitude; especially abundant on the sides of the tender crumbling wayside banks, Government Cinchona Plantations. This is distinguished from the next species by the longer more numerous oblong fronds, longer stipites different scales and peculiar form of the rootstock. The latter though decumbent is not repent, and the fronds spring from all sides of it. It is much elongated, reaching a span or more long, slender and densely clothed with small black scales; the stipites are very numerous and run appressed parallel to it like splints, completely enclosing and in the outer part concealing it.—Colombia, Ecuador, Peru.

23. *A. tectum*, WILLD.—*Rootstock* short, creeping, densely clothed with rather squarrose subulate black glossy scales. *Stipites* rather slender, close, 4-8 in. l., meally looking, with pale dark-centered appressed scales. *Fronde*s  $\frac{3}{4}$ -1 $\frac{1}{4}$  ft. l.,  $\frac{3}{4}$ -1 $\frac{1}{4}$  in. w., acuminate with a fine point, tapering likewise to the coriaceous grayish-green, upper surface clothed with deciduous thin gray slightly frimbriate-edged, much appressed peltate scales, the under sprinkled over with minute brown stellate ones. *Margins* thin and somewhat reflexed. *Rachis* raised beneath and clothed like the stipites. *Veins* obscure, very close, forked and simple fertile fronds  $\frac{1}{3}$  in. w. on much longer stipites.—*A. rubiginosum*, Fée.

Jamaica; common on open banks from 3,000-5,000 feet altitude. Allied to the two following in the characters of its vestiture, but much the smallest silvery or meal coloured scales. The scales of the upper side are a pale silvery gray, fine and slightly fimbriate-edged but not stellate, eventually deciduous leaving the surface nearly bare. Those beneath form very minute scattered stellate reddish brown cilia, smaller than in any of its allies, which also are more or less deciduous. When naked, though larger and firmer, the species most resembles *A. viscosum*.—Mexico, Brazil, Peru.

24. *A. laminarioides*, BORY.—*Rootstock* woody, shortly repent, or sub-repent, clothed with linear-acuminate blackish scales. *Stipites* arching or pendent, 4-8 in. l., crowded, clothed with mixed peltate and linear-acuminate appressed pale fringed scales. *Fronde*s arching or pendent, tapering to both ends, the apex acuminate or cuspidate, 1-2 ft. l.,  $1\frac{1}{2}$ -2 $\frac{1}{2}$  in. w., chartaceous or subcoriaceous, light-green, the upper surface clothed with deciduous gray stellate, peltate small acuminate scales, those of the under side darker, more copiously stellate, linear-acuminate on the costa. *Veins* simple and forked, patent, inconspicuous; fertile fronds, reduced, 8-10 in l.,  $\frac{3}{4}$  in. b., obtuse or acute, the scales of the upperside dense and feltlike.—Syn. Fil. p. 523 2nd Ed.

Guiana; plentiful in places on creeks of the Demerara and Essequibo Rivers, growing on trees or banks first gathered by Liprieu in French Guiana. This is smaller than *magnum* which it most resembles, with plain or less repand or undulate margins firmer texture, and the scales of the under surface more simply stellate.—Endemic.

25. *A. magnum*, BAKER.—*Rootstock* woody, shortly repent, scales small, subulate, blackish. *Stipites* clustered or tufted pendent 4-7 in. l., furfuraceous with minute appressed fimbriate scales having a dark nucleus mixed with which are a few larger linear spreading ones. *Fronde*s pendent,  $1\frac{1}{2}$ -3 $\frac{1}{2}$  ft. l., 2-2 $\frac{1}{2}$  in. w., repand or undulate margined, firm, but not coriaceous, pellucid when fresh; tapering

both at the apex and base, the former acuminate or acute, often blunt or retuse. Scales copious at first covering the surfaces, more or less deciduous especially on the upper side small appressed stellato-fimbriate, the costa more thickly coated with linear fimbriate paleæ, at first silvery gray, later darker with a slightly ferruginous tinge, the surface beneath the vestiture light-green. *Veins*, close, horizontal simple or forked. Fertile *fronds* 1-1½ ft. l.,  $\frac{3}{4}$  in. w., mostly obtuse or rather shorter petioles, scales of the upper side more dense, imbricating, becoming fulvous or tawny with age, those of the costa which is clearly marked beneath, smaller.—Baker in Gard. Chron. 501, Vol. XX.

Guiana; infrequent, gathered on the banks of the Demerara and Mazaruni Rivers, growing on trees. This is the largest species of all, distinguished by this character and the undulations of the fronds. The vestiture is not so dense as to conceal the colour of the parenchyma and much of it, though not all, falls away with age. It is very near the last species, from which the larger nucleus to the scales, larger size and undulations, mark it.—Endemic.

26. *A. auricomum*, KUNZE.—*Rootstock* very shortly repent, densely clothed with bright dark brown ciliate-edged, scales. *Stipites* tufted or sub-tufted several 1½-2½ in. or more long, freely clothed with spreading, very ciliate ferruginous scales. *Fronds* pendent, ½-1 ft. l., ½-1 in. w., tapering both ways nearly equally, the apex acuminate or acute, even or repand, margined, thin, membranaceous rusty green, both surfaces sprinkled with dark brown long-ciliated minute scales, those on the upper side reduced to stellate hairs. *Rachis*, slender, clothed like the stems. *Veins* simple and forked  $\frac{3}{4}$ -1 li. apart; fertile fronds smaller, on rather longer stipites. *A. acuminans*, Fée.

Jamaica and Guiana; infrequent on the sides of rocks in open or shaded situations at 2,000-3,000 ft. altitude. Gathered in coffee fields above Mount Moses, St. Andrew. As locally represented, this is a smaller species than the next, of thinner texture and much less and finer vestiture. In vestiture the Guiana specimens quite agree, but they are larger. The species is, however, very variable in size.—Mexico, Colombia to Peru.

27. *A. muscosum*, SWARTZ.—*Rootstock* stout, erect, very densely clothed with long linear-acuminate, reddish brown slender scales. *Stipites* tufted, strong, 3-8 in. l., densely clothed with two kinds of bright rather tawny scales, one small and appressed, the other large loose and spreading. *Fronds* erect, lanceolate-oblong, ½-1 ft. l., 1½-2¼ in. w., rounded at the apex, the base cuneate or nearly rounded, the margins often repand and uneven, coriaceous, dark-green beneath the vestiture, both surfaces equally scaly, the scales generally diffused but not very dense, those of the upper side pale and more appressed, ultimately deciduous, beneath tawny ciliate-edged, most plentiful along the costa and edges. *Veins* obscure,  $\frac{3}{4}$ -1 li. apart forked, fertile fronds much narrower and on longer stipites.—Pl. Fil. t. 126.

Jamaica; common on the branches of trees in damp forests at 5,000-6,000 ft. altitude, well distinguished by the upright rootstock, tufted stipites with abundant large spreading scales, and erect round-ended fronds. It has similar pale bleached scales to *lepidotum* on the upper surface, which also becomes naked in time, though as it grows in more sheltered situations, not so quickly or completely, as in that species. The former from the mainland differs in some particulars from the Jamaica form, which I have described and that is no doubt the type of the species.—Hayti, and from Mexico to Brazil and Peru.

28. *A. cuspidatum*, WILLD.—*Rootstock* stout, woody, creeping, clothed with blackish fine subulate palæ. *Stipites* sub-tufted,  $\frac{1}{2}$ – $1\frac{1}{4}$  ft. l., clothed with appressed deciduous scales with a dark centre and paler edge. *Fronde*s pendant,  $1\frac{1}{2}$ –2 ft. l., 3–4 in. b., the apex cuspidate, the base narrowed and cuneate, coriaceous green surfaces scaly, those above deciduous, beneath densely matted, fimbriatè-edged or stellate, margins even or repand. *Veins* patent, simple and forked, fertile fronds, the same shape but not so ample, the stipes nearly equal in length.—Syn. Fil. p. 411. *A. Lindigii*, Karst.

Guiana; gathered by Schomburgh; a large species closely allied to *laminaroides* and *magnum* with more vestiture beneath, and the ends of the fronds uniformly cuspidate. The weathered upper surface becomes naked with age.—Guadeloupe, Venezuela to Brazil, and Peru.

29. *A. perelegans*, FEE.—*Rootstock* shortly repent, woody, clothed with linear-acuminate very dark scales. *Stipites* slender, subtufted, 6–8 in. l., slightly deciduously scaly. *Fronde*s  $\frac{3}{4}$ –1 ft. l.,  $1\frac{1}{4}$ – $1\frac{1}{2}$  in. b., the apex acute, the base narrow and cuneate; subcoriaceous green, lower surface clothed with matted ferruginous or brown fimbriate scales; the upper more thinly. *Margins* even or repand. *Veins* simple or forked patent, fertile fronds reduced, linear.—Syn. Fil. p. 411.

Dominica; Couliabou mountains, gathered by Dr. Imray, this is a species not very commonly known. In vestiture it most resembles *auricomum*; the vestiture being less matted and copious than in *squamosum*.—San Domingo, Venezuela, and Brazil.

30. *A. lepidotum*, WILLD.—*Rootstock* short creeping, densely clothed with glossy blackish scales; *Stipites* contiguous 5–8 in. l., coated throughout with appressed pale, or at first, rather fuscous scales; *Fronde*s  $\frac{3}{4}$ – $1\frac{1}{4}$  ft. l.,  $\frac{1}{2}$ –1 in. w., acuminate or bluntish at the apex, the base tapering, coriaceous, dark green beneath the vestiture, upper covered by a thin coating of very pale much appressed lanceolate-scales which at length drops off, leaving it naked, the under most densely matted and glossy with imbricating tawny or fibrous or ciliate-margined scales which are persistent. *Veins* close, obscure; fertile fronds somewhat reduced, terminating abruptly at the unequal base; the stipites longer.—Pl. Fil. t. 139. *A. vestitum*, Schlach.

Jamaica; common on open banks at 4,000–5,000 ft. altitude. This of all the species is the most densely coated on the under surface. The scales of the upper side are very deciduous so that the mature fronds are naked above and densely coated beneath by which features the species may be immediately recognised. The abrupt termination and unequal sides at the base of the fertile fronds, shown particularly in the larger ones, is also a good distinguishing character not possessed by any other species. In the partially developed state of the fronds the scales of the stipites are squarrose.

31. *A. Engelii*, KARST.—*Rootstock* woody, shortly repent, clothed with fine acuminate dark coloured scales. *Stipites* tufted  $\frac{1}{2}$ –1 ft. l., strong, freely clothed with small linear-acuminate ciliate edged dark-centred pale margined scales. *Fronde*s 1–2 ft. l.,  $1\frac{1}{2}$ – $2\frac{1}{4}$  in. w., obtuse or acuminate at the apex the base cuneate or tapered, coriaceous, dark-green, scales of the upper side copious but deciduous those beneath densely felt-like, ferruginous lanceolate copiously ciliate-edged the base somewhat cordate, spreading fringe-like along the

even margins. *Veins* close patent simple and forked, fertile fronds reduced or stipites  $1\frac{1}{2}$  ft. l., or more, more densely paleaceous on the upper side.—Karst. Fl. Columbia.

Guiana; gathered at Roraima im-Thurn n. 93. This is a fine species marked by its stiff coriaceous texture, long strong petioles and beautiful bright and very copious felt-like vesture. The petioles are so strong that the habit is probably quite erect, the sterile fronds being over topped by the fertile. There are two forms, one with the apex of the fronds rounded or obtuse as in *mucosum* and the other acuminate, both of which are represented in the specimens gathered by Mr. im-Thurn.

32. *A. squamosum*, SWARTZ.—*Rootstock* short, stout, densely clothed in glossy blackish ciliate-edged scales. *Stipites* 4–8 in. l., copiously furnished with spreading dark fringed and ciliate reddish-brown scales. *Fronde*s pendant,  $\frac{1}{2}$ – $1\frac{3}{4}$  ft. l., 1–2 in. w., tapering at the base, the apex acuminate, flaccid when fresh, drying sub-coriaceous dark rusty green, freely clothed, especially beneath and on the rachis above and along the margins, with reddish brown copiously ciliated scales. *Veins* simple or forked,  $\frac{3}{4}$ –1 li. apart, fertile fronds  $\frac{1}{2}$ – $\frac{3}{4}$  in. w. on longer stipites.

Jamaica; very abundant on trees in forests above 5,000 feet altitude, a fine species, easily recognised by its copious clothing of bright reddish brown scales, which along the margins form a distinct fringe; except on the rachis, they are much more plentiful and longer on the under side than on the upper. It presents two states the larger of which is much less common than the smaller, but there are no variations between them.—Mexico, Brazil and Eastern Tropics.

33. *A. decoratum*, KZE.—*Rootstock* upright, densely clothed with chestnut linear-lanceolate, attenuate undulate scales; *Stipites* tufted 6–9 in. l., erect, dark brown, most densely clothed with squarrose brown ovate roundish pointed scales  $\frac{1}{4}$  in. l., and nearly as wide with a cordate base. *Fronde*s oblong-lanceolate, 1– $1\frac{1}{2}$  ft. l., 3–4 in. w., coriaceous, dark-green rounded or cuneate at the base, the point acute or cuspidate, margins entire repand, or not, and fringed on each side with imbricating cordate-orbicular scales,  $\frac{1}{2}$  li. w., and l., mid-rib also scaly beneath, other surfaces naked. *Veins* fine, close, oblique, entering the marginal thread which bears the scales; fertile fronds 6–12 in. l., 2– $2\frac{1}{2}$  in. w., without the marginal fringe on usually longer stipes.—Syn. Fil., p. 404. Olfersia Presl.

Guiana; Schomburgh n. 1647; im Thurn, n. 266; gathered on the slope rising to Roraima. A very striking and peculiar species by reason of the dense coating of large brown squarrose scales that envelops the stipites from bottom to top ascending the rachis, gradually reduced in size and appressed to the top, with a line of shorter flat imbricating scales along both sides of the surface of the margin lying back to back with the fruit between. The scales of the rachis are descending while those of the margins are ascending.—Guadeloupe, Brazil and Peru.

34. *A. hybridum*, BORY.—*Rootstock* short, or shortly elongated, densely clothed with dark fine almost hair-like scales. *Stipites* tufted or sub-tufted, slender, 3–6 in. l., sparsely clothed with spreading dark hair-like scales, ultimately naked, light brown. *Fronde*s spreading or pendent  $\frac{1}{2}$ – $1\frac{1}{4}$  ft. l.,  $1\frac{1}{2}$ –3 in. w., oblong or linear-lanceolate acuminate the base cuneate, chartaceous, very pellucid bright green, rather paler beneath with a slight fringe of dark hairs along the somewhat thickened margin while immature,

quite naked with age. *Veins* simple or forked  $\frac{3}{4}$ -1 li. apart, fertile fronds the same shape but reduced.—Hook. Grev. Icon. Fil. t. 21. *A. var. denudatum*, JENN., much smaller and much barer. *Stipites*  $1\frac{1}{2}$ -3 in. l., fronds 3-7 in. l., the fertile a fourth or fifth the size of the barren.

Jamaica; infrequent on open banks, growing with other herbage at 2,000-3,000 feet altitude, but distinguished by the very dark hair-like deciduous scales that fringe the margins, midrib on the under side, and petioles. With age the fronds become nearly or quite naked when, but for their thinner texture they might be mistaken for those of *latifolium* which in form they nearly resemble, the venation however being rather more open, and the apex more inclined to cuspidate. The petioles and rachises vary from stramineous to a bright or dull reddish brown. *A.* is a small variety a fourth or sixth the size of the types with very little vestiture, uniformly permanent in these characters. It is much more plentiful, generally gregarious with the herbage. *A. Boryanum* FÉE intermediate between *villosum* and *hybridum*, the fronds blunt or truncate retuse and viviparous at the apex, very open venation and hairy on the surfaces likely inhabits Jamaica but has not yet been recorded.

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35. *A. scolopendrifolium*, RADD.—*Rootstock* most densely clothed with undulate chestnut scales that are  $\frac{1}{2}$ - $\frac{3}{4}$  in. l.,  $\frac{1}{2}$  li. w. *Stipites* tufted light-brown 6-8 in. l., freely clothed with squarrose black hair. *Fronds* oblong-lanceolate, 12-15 or 18 in. l., 2-3 in. w., acute or acuminate, the base cuneate or tapering, light green, chartaceous; margins entire and with the costæ on both sides clothed with spreading hairs of a black or aureous tinge. *Veins* fine, close, simple and forked running into the marginal thread which bears the scales; fertile fronds much smaller without marginal scales on rather longer stipes.—Syn. Fil. p. 407.

Guiana; gathered by Hostman No. 1082. This is clothed like *decoratum* but the vestiture is in the form of hairs instead of paleæ, resembling those of *hybridum*, but much more plentiful, of which it might perhaps be regarded as a more crinite state.—Venezuela to Brazil and Peru.

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36. *A. Boryanum*, FÉE.—*Rootstock* strong woody, repent, clothed with dark linear-subulate scales. *Stipites* tufted, 4-9 in. l., freely paleaceous. *Fronds*  $\frac{3}{4}$ -1 ft. l., 2-3 in. w., the apex acute and sometimes viviparous, the base rounded or shortly cuneate, papyraceo-membranous, pellucid surfaces thinly clothed with furfuraceous paleæ, which freely fringe the margins, and the costa beneath especially at the base. *Veins* patent distinct, simple and forked, open, terminating in thickened apices which are pellucid at first, subsequently covered with black dots which form a line just within the sub-even margin; fertile fronds smaller 6-8 in. l., 1 in. w., on longer stipes.—Syn. Fil. p. 407.

Jamaica, St. Vincent, Grenada, Dominica, Trinidad. This has the habit and conformation of *latifolium* marked by its thin pellucid substance allied to *hybridum* and *scolopendrifolium*.—Guadeloupe and Martinique.

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37. *A. apodifum*, KAULF.—*Rootstock* short and broad, very densely covered with light aureous long soft linear scales. *Stipites* tufted, several  $\frac{1}{4}$ - $\frac{1}{2}$  in. l., furnished with a fine deciduous spreading hairs. *Fronds* spreading flabellate, 6-10 in. l.,  $\frac{3}{4}$ -1 $\frac{1}{2}$  in. w., the apex shortly acuminate gradually tapering from the middle or upper third to the base, chartaceous, pellucid light but rather dullish green, a



thin deciduous short fringe of hairs along the margins, other parts naked. *Veins* forked, fertile fronds the same shape, but much smaller.—Hooker and Grev., Icon. t. 99.

Jamaica ; plentiful on open banks and in shade from 2,000 ft. altitude upwards, but chiefly in the middle mountain region ; a peculiar and well characterised species. The rootstock forms a flat broad cushion clothed densely with the bright soft light aureous undulate scales. From this the fronds spring in a loose cluster and spread flatly in the form of a fan. The stipites are very short and hardly longer in the fertile than in the barren fronds, both of which in some cases appear as if quite sessile. And the vestiture consists only in a short thin marginal fringe which is deciduous.—West Indies generally Brazil and Peru.

38. *A. raywaense*, JENM. —*Rootstock* shortly repent, woody, clothed with fine filamentose, wavy reticulated fulvous ferruginous scales, *Stipites* tufted, about  $\frac{1}{2}$  in. l., clothed like the rootstock. *Fronde*s pendent, oblanceolate, 1–2 ft. l.,  $1\frac{1}{2}$ – $2\frac{1}{2}$  in. w., tapering to a narrow membrane at the base, the apex acute or acuminate sometimes cuspidate, membrano-chartaceous pellucid bright green, fringed along the margins and rachis with bright fulvous hairs, often parts of the upper surface slightly ciliate, glabrous, at the apex. Margins even or repand. *Veins* patent simple and forked ; fertile fronds 9–12 in. l.,  $1$ – $1\frac{1}{4}$  in. b., tapering only in the lower half to the petioles which are  $\frac{1}{4}$ – $\frac{1}{2}$  in. l., the apex acuminate.

Guiana ; common on trees in the region of Mt. Raywa and on upper parts of the Isorooro River extending to the sandstone regions. This resembles in shape of frond and disposition of the vestiture *apodum* of which it is not unlikely a large variety, with a more plentiful fringe to margins and rachis. The fronds taper downwards to a proportionately greater length and the haft is slightly more distinct, and the fertile fronds are as large as the sterile ones of *apodum*.—Endemic.

39. *A. cubense*, METT. —*Rootstock* short, fibrous, densely coated with aureous lanceolate-acuminate crispate scales. *Stipites* contiguous or subtufted  $\frac{1}{2}$ – $1\frac{1}{2}$ —or 2 in. l., furnished with deciduous spreading rather ferruginous hairs. *Fronde*s oblanceolate spreading 4–6—in l.,  $1\frac{1}{4}$ – $1\frac{1}{2}$  in. w. ; shortly pointed or rounded at the apex, the base much tapering and decurrent on the slender petioles, chartaceous densely pellucid, dotted ; bright green, deciduously clothed with scattered hairs more plentifully on the midrib, a copious aureous fringe to the margins. *Veins* close, 1–3 times forked, fertile fronds much smaller the same shape, but the tapering lower part more elongated.

Jamaica ; infrequent between 3,000–5,000 ft. altitude. Allied to *apodum*, but distinguished by the smaller rootstock and shorter oblanceolate fronds which are rounded or very shortly pointed in the broad upper part, the base tapering gradually into the slender petioles, by the more copious though deciduous hairs, which as in the four preceding species have a beautiful aureous tinge, along the margins and by the closer dichotomously branched veins. The rootstock is at length shortly repent, and in this state stipites are not so near together. These old fronds become nearly bare but more or less of the marginal vestiture is retained to the last.—Cuba.

40. *A. spathu'atum*, BORR. —*Stipites* tufted from a small scaly rootstock, very slender  $1\frac{1}{2}$ –2 in. l., freely clothed with spreading silky yellowish bright hairs. *Fronde*s spreading  $\frac{1}{2}$ –2 in. or 3 l.,  $\frac{1}{4}$ – $\frac{3}{4}$  in. b., oblong or spatulate, the apex rounded, the base cuneate or tapering, soft in growth, at length firm, pale green, both freely clothed with

silky yellowish hairs which are fringe-like around the margins. *Veins* forked, fertile fronds on longer stipites, rounded ovate or elliptical,  $\frac{1}{4}$ – $\frac{1}{2}$  in. l., and nearly as w. Fil. Exot. t., 29.—*A. piloselloides*. PRESL.

Jamaica ; infrequent on banks and rocks with moss and other herbage above 2,000 ft. altitude. The localities for this species are infrequent but it is usually plentiful where found. A pretty diminutive plant that resembles much, half-buried in the moss in which it often grows, a sundew. It is abundantly fertile, and I have never observed it at any season of the year without soriferous fronds. The small fibrous rootstock is clothed densely with bright golden silky scales. The fronds are few or several.—West Indies to Peru, Ceylon, Natal.

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41. *A. Aubertii*, DESV.—*Var*: *crinitum*, BAKER.—*Rootstock* elongated, erect, freely clothed with fine castaneous scales, *Stipites* tufted, stramineous erect, rather slender,  $1\frac{1}{2}$ –2 in. l., densely clothed with dark spreading scales. *Fronde*s linear lanceolate, 6 in. l., about  $\frac{1}{5}$  in. w. rather more or less tapering to both ends, thinly chartaceous, pellucid light green, both surfaces and margins especially clothed but not densely, with hairs, mid rib also ciliate, and dull straw coloured ; veins spreading at a wide angle, simple, about a li. apart ; fertile fronds much smaller, less acute, and less tapering at the base ; 2 in. l.,  $\frac{1}{3}$  in. w., on a slender stipe 6 in. l., clothed with spreading hair like scales. Syn. Fil. p. 406. *A. Klotzschii*, MORITZ.

Guiana, in Thurn, gathered on the base of Roraima, resembling *A. linease Fée*. Mr. Baker says “recedes from the Brazilian and Columbian type of the species towards *A. villosum* by its much more erinite lamina both in the sterile and fertile frond, and by the stipes being densely clothed with squarrose subulate brown paleæ, as in the Venezuelan.—*A. Reichenbachii*. Moritz Trans. Lims. So. Vol. II part 13, 2nd Series. Venezuela, Guatemala, Natal, Zambesiland, Fernando Po.

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42. *A. Lindeni*, BORY.—*Rootstock* short, densely clothed with darkly ferruginous, crispate, slightly ciliate fine hair-like scales. *Stipites* tufted, very slender 3–5 in. l., freely furnished with spreading ferruginous hairs. *Fronde*s pendent variable in size, the smaller ovate or ovate-oblong, the larger oblong-lanceolate,  $1\frac{1}{2}$ –5 in. l.,  $\frac{3}{4}$ – $1\frac{1}{4}$  in. w., the apex acute or roundly pointed, the base rounded or cuneate, chartaceous densely pellucid-dotted ; dark green above, paler beneath, more or less ciliate on both sides and with a fringe of ferruginous hairs along the margins, midrib slender. *Veins* open, evident,  $1$ – $\frac{1}{4}$  li. apart, simple or forked ; fertile fronds on longer stipites rounded at both ends elliptical  $\frac{3}{4}$ – $1\frac{1}{2}$  in. l.,  $\frac{1}{2}$ – $\frac{3}{4}$  in. w.—*A. venustum*,—LIEBM.

Jamaica ; infrequent, on the sides of large rocks and banks in the forest above 2,000 feet altitude just below the crown of Blue Mountain peak. Remarkable for its variable fronds and long very slender stipites, open venation and the dark tan coloured scales, which on the surfaces of the fronds are to a considerable extent deciduous.—Tropical America.

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43. *A. siliquoides*, JENM.—*Rootstock* short, stoutish, fibrous, densely clothed with silky hair-like yellowish or rather ferruginous scales ; *Stipites* tufted, several rather strong, 2–5 in. l., freely clothed with long spreading aureous hairs ; *Fronde*s linear-oblong, pendent  $\frac{1}{2}$ –1 ft.,  $\frac{5}{8}$ – $\frac{7}{8}$  in. w., the apex acute or bluntish, the base tapering, densely pellucid dotted, light green freely clothed, especially along the somewhat sinuate margins, with silky golden hairs. *Veins* simple

and forked,  $\frac{3}{4}$ -1 li. apart. fertile fronds rounded at both ends ovate or elliptical,  $\frac{3}{4}$ -1 $\frac{1}{2}$  in. l.,  $\frac{1}{2}$ -1 in. w., stipites longer thickened in the upper part.—Journal Botany, 1881, p. 53.

Jamaica; infrequent on open banks and rocks from 2,000-5,000 ft. altitude. Distinguished from *villosum* by the narrower thicker more hairy barren fronds and difform spoon shaped fertile ones which are at first folded together with close even edges like pods, opening out flat at maturity. It has a peculiar astringent smell when growing. The long silky hairs densely envelope the young fronds. Seen in sunlight on all parts of the plants, they have a most exquisite golden tinge.—Endemic.

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44. *A. villosum*, SWARTZ.—*Rootstock* short, densely clothed with hair-like dark brown or ferruginous scales. *Stipites* tufted slender, 2-5 in. l., clothed with long spreading ferruginous hairs. *Fronde*s pendant, lanceolate, oblong, the apex cuspidate or acuminate, the base cuneate 4-8 in. l., 1-1 $\frac{1}{4}$  in. b., very thin, pellucid; pale green thinly clothed on both sides with long spreading hairs, which form a fringe to the rather uneven margins. *Veins* visible, open, 1 $\frac{1}{2}$  li. apart, simple and forked; fertile fronds the same shape, but greatly reduced, the stipites not much if any longer.—*A. Plumieri*, Fée.

Jamaica; common in damp forests from 2,000-5,000 ft. altitude on the side of rocks; the commonest and best known mountain species of this group. The substance is very thin and pellucid in which the veins are conspicuously visible, unlike the three preceding the fertile fronds though much smaller are the same shape as the barren, with a more copious gold tinted fringe to the margins, and a band beneath free of sporangia which contributes a very characteristic feature.—West Indies, Tropical America.

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45. *A. crinitum*, LINN.—*Rootstock* short, densely clothed with soft undulated yellowish scales. *Stipites* tufted, 6-10 in. l., strong erect dark coloured, most abundantly furnished with spreading long blackish hairs. *Fronde*s elliptical, or elliptical-oblong  $\frac{3}{4}$ -1 $\frac{1}{2}$  ft. l., 6-9 in. w., broadly rounded at both ends or the top shortly pointed, fleshy, drying chartaceous densely pellucid-dotted, very dark green, both surfaces similarly criniferous the margins freely fringed with long blackish hairs, the midrib clothed more abundantly. *Veins* copiously areolated, areolæ elongated directed to the margins fertile fronds much reduced the same shape on longer stipites—pl. fil.—t. 125, Hook & Grev. Icon. t. 1., Fil. Ex. t. 6., Hymenodium, Fée.

Jamaica; common in places on rocks and branches in very moist forests between 1,000 and 4,000 ft. altitude. A singular but well known species that has long been among the curiosities of European ferneries. The fronds are as large as dinner table mats, and are the largest entire fronds in the American fern flora. The scales of the stipites are  $\frac{1}{2}$  in. l., spreading and exceedingly copious. Those scattered on the surfaces drop away in the course of time leaving them bare.—West Indies, Mexico.

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46. *A. peltatum*, SWARTZ.—*Rootstock* very slender, filiform, free creeping, clothed with bright brown lanceolate scales that are somewhat spreading. *Stipites* filiform, scattered, slightly paleaceous to the top, or at length naked, erect, 1-3 $\frac{1}{2}$  in. l. *Fronde*s flabellate,  $\frac{1}{2}$ -2 in. diameter repeatedly dichotomously divided to the axis into numerous spreading linear segments  $\frac{1}{4}$ - $\frac{1}{2}$  li. w., the ends of which are bifid or retuse and the final tips bluntish, firm dark green, the under surface slightly scaly. *Veins* forked simple in the final divisions; fertile fronds palmate on longer more filiform stipites, reniform entire

or slightly bi-lobed, nearly orbicular, with a thin scarioso margin; *veins* repeatedly dichotomous.—Pl. Fil. t. 50. *Rhipidopteris*. Schott.

Jamaica; infrequent on mossy rocks and banks in forests on shady moss grown places, from 2,000–6,000 ft. altitude. The thin wiry scaly rootstock runs freely throwing up fronds from  $\frac{1}{2}$ –1 in. apart, the fertile being few in number to the sterile. The primary divisions of the sterile fronds are not stronger than the other divisions, *A. flabellatum*, H.B.K., which has similar rootstock and stipes but sub-entire fronds  $\frac{1}{2}$ – $\frac{3}{4}$  in. br., the outer edge crenate or dentate, the fertile frond half the size; is found in Guiana, Cuba, Guadeloupe, Martinique, Mexico, Peru, Brazil.

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47. *A. sorbifolium*, LINN.—*Rootstock* thick as a quill, long creeping vertical ligneous, scaly or rarely glabrous; *Stipites* few or many contiguous or apart erecto-spreading  $\frac{1}{2}$ – $1\frac{1}{4}$  ft. l., scaly at the base and often more or less so upwards; *Fronde*s pinnate  $1$ – $2\frac{1}{2}$  ft. l.,  $\frac{1}{2}$ – $1\frac{1}{4}$  ft. w., rachis slender, dark brown, margined or not in the outer part, naked or paleaceous. *Pinnæ* patent, cuneate, or rounded at the articulated sessile or stipitate base, acuminate or cuspidate even or crenato-serrate margined, plain or striate-surfaced, 5–8 in. l.,  $\frac{1}{2}$ – $1\frac{3}{4}$  in. w., dark green above, beneath pale chartaceous or membranous chartaceous pellucid glabrous or slightly scaly on the rib beneath; *Veins* patent simple or forked usually close; fertile fronds the same shape, but pinnæ greatly narrowed and linear.—Sl. t. 38. Herb. p. Sl. Pl. Fil. t. 117. *Onclea*, Swartz. *Lomaria*, Klf. *Stenochlaena*, J. Smith. *Lomariopsis*, Fée.

Jamaica; very abundant in forests ascending the trunks of trees, from the lowest valleys up to 4,000 or 5,000 ft. It begins growth on the ground, and at this stage the rachis is flatly winged and the pinnæ uniformly toothed. The forms are exceedingly numerous, and no very clear line can be drawn between them. In Jamaica there are two states—in one of which the pinnæ are numerous 12–18, the terminal one absent, the rachis ending in a leafless point; in the other the pinnæ are few (6–8) much broader and shorter, the terminal one present. Is found too in Guiana. Trinidad has a variety with numerous narrow pinnæ, the stipes and rachis of both kinds of fronds densely paleaceous. *A. Yapurense*, Mart., is a broad pinnæ variety of few or several leaflets, often partly fertile and barren in the same frond in small plants, of a dark dull colour and very prominent venation found in Trinidad and Guiana. The Guiana forms are usually twice as broad in the pinnæ as the West Indian. The fertile pinnæ vary from 2–6 li. w.—Cuba to Peru and Brazil, Guiana Coast, Mascaren Isles Cochin China to New Caledonia.

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48. *A. acuminatum*, HOOK.—*Rootstock* ligneous, strong, long, repent, densely clothed with brown filamentose scales  $\frac{1}{4}$ – $\frac{1}{2}$  in. l. *Stipites* strong apart, sub-erect, brown paleaceous at the base like the rootstock upwards naked, 1 ft. l. *Fronde*s oblong or ovate-lanceolate acuminate, the base truncate 1–2 ft. l., 10–18 in. w., bi-pinnate, chartaceous or sub-coriaceous, glossy green, naked; *Pinnæ* spreading 8–10 in. l., 3– $4\frac{1}{2}$  in. w., the inferior shortly petiolate truncate serrate shortly acuminate at the sub-entire apex, within this pinnatifid, the lower half or more pinnate. *Pinnulæ* contiguous  $1\frac{1}{2}$ –2 in. l.,  $\frac{1}{2}$ – $\frac{3}{4}$  in. w., rounded and sessile or shortly stipitate at the base, the apex acute, or shortly acuminate and serrate, the margins within this serrate, or appressed dentate. *Veins* in bundles running to the

margin of few or several branches. Fertile fronds nearly as large, the pinnulæ distant and copiously lobed along both margins the final segments, 1-6 li. l., with the sori on both sides.—Syn. Fil. p. 414.

Guiana; common in forests at the sources of the Irooroo River; this is probably not more than a variety of *caudatum* which it resembles in the barren fronds, differing in the fertile which are uniformly tri-pinnatifid.—Brazil.

49. *A. caudatum*, Hook.—*Rootstock* strong, ligneous, widely repent, densely clothed with subulate brown palæ. *Stipites* approximate or apart, about 1 ft. b., strong brown or stramineous, scaly at the base like the rootstock. *Fronde*s 2-2½ ft. l. and w., sub-deltoid, or deltoid oblong, bi-pinnate, subcoriaceous dark green paler beneath glabrous. *Pinnæ* 1-1¼ ft. l., 6-9 in. w. pinnate, the apex pinnatifid shortly petiolate. *Pinnulæ* 3-4 in. l., 6-8 in. w., truncate and slightly stipitate at the base; acuminate and slightly serrate at the apex, the margins within this shallowly notched into broad appressed teeth or shallow lobes. *Veins* evident in pinnate groups running to the margins of the rudimentary lobes. Fertile fronds similar in shape, the pinnulæ much narrowed, distant, entire and linear or lobate, 2-3 in. l., 1½-3 in. w., the sori on both sides of the margin or final lobes. Syn. Fil., p. 414.—*Polybotrya*, Gr. Fl., B.W.I., I. p. 677.

Trinidad and Guiana in moist forests ascending the trunks of trees many feet. Remarkable in its long linear fertile pinnules. In Guiana this is a very common species to be found almost everywhere over the lower forest regions.—Mexico to Brazil and Peru.

50. *A. osmundaceum*, Hook.—*Rootstock* strong, ligneous, long-creeping, vertical, densely filamentose, brown, scaly. *Stipites* contiguous or apart, scaly at the base like the rootstock, brown ¾-1 ft. l. *Fronde*s sub-deltoid 1½-3 ft. each way, tri-quadri-pinnatifid subcoriaceous naked, or the costæ and rachis fibrillose beneath, pinnæ petiolate 1-1½ ft. l., 9-12 in. w., the larger deeper on the mid-rib, *pinnulæ* shortly petiolate, lanceolate acuminate, 3-7 in. l., 1-2½ in. w. within pinnate, above this pinnatifid passing through lobes to the fine serrulate point, tertiary segments ¾-1¼ in. l., 2½-4 l. w., acute or obtuse, deeper on the upper side at the base, the under rather cut away and plain margined, the inferior ones roundly lobed, the outer serrulate or crenate entire. *Veins* evident beneath pinnate in the larger lobes forked in the smaller fertile fronds much the same shape tri-quadri-pinnatifid, ultimate segments soriferous on one or both sides, about 1 li. w., and 2-6 li. l.—Pl. Fil. t. 32. Sl. His. t. 60, Herb. pp. 116, 154, 155. Hook. Gen. t. 78. *B. Polybotrya*, H.B.K. *P. cylindrica*, Kaulf. *P. cyathifolia*, Fée. Jil. Ant. t. 2.

Jamaica; widely dispersed in woods and forests from sea level to 4,000 feet altitude ascending the trunks of trees, often twenty or thirty feet. The fertile fronds are transient and are only produced at seasons, so that the plants are generally seen with barren fronds only. The tertiary fertile pinnules are in the larger states sinuate lobed or pinnatifid.—Trinidad, Guiana, to Brazil.

51. *A. cervinum*, SWARTZ.—*Rootstock* ligneous, short, repent, densely clothed with brown or ferruginous long filamentose silky scales. *Stipites* contiguous or apart, erect light brown ¾-1¼ ft. l., clothed at the base like the rootstock. *Fronde*s pinnate, erecto-spreading or pendant, 1½-2½ ft. l., ¾-1½ ft. w., composed of a terminal

pinna and few or several inequilateral oblong-lanceolate lateral ones, which are 6-9 in. l.,  $1\frac{1}{4}$ - $2\frac{3}{4}$  in. w., the upper base deeply rounded, the inferior gradually cut away to nothing, the apex tapering and acuminate; sub-coriaceous, light green, glabrous. *Veins* patent, simple and forked, close connected in the thickened margin, fertile fronds regularly bi-pinnate, the pinnae linear acuminate; segments very numerous, 3-6 li. l., about 1 li. w., soriferous on both sides.—Pl. Fil. t. 154. Sl. Hist. t. 37, 41, f. 2. Herb. pp. 79, 87. Fil. Exot. t. 43. *Osmunda* L. *Polybotrya*, Klf. *Olfersia*, Kze.

Jamaica; common in moist forests up to 3,000-4,000 ft. altitude. In Jamaica this is constantly a terrestrial species, while in Guiana it is as constantly epiphytical. *Fronde*s are occasionally found intermediate in character between the normal barren and fertile with the pinnae pinnatifid the veins curiously pinnate and areolated in the narrow pectinate segments barren throughout, or partly or completely fertile.—Trinidad, Guiana, Dominica, St. Lucia, Brazil, Peru.

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52. *A. Fendleri*, BAKER, *Rootstock* short, woody, short-creeping puberulous or slightly furfuraceous-scaly. *Stipites* approximate, erect,  $1\frac{1}{2}$  ft. l. furfuraceous at the base. *Fronde*s pinnate, chartaceous, very densely pellucid-dotted, minutely papillose dark green, glabrous,  $1\frac{1}{2}$  to 2 ft. l., and nearly as wide composed of 3-6 spreading lateral pinnae and a similar large terminal one, oblong lanceolate acuminate, the base of the lower ones cuneate, or tapering and sometimes shortly stipitate, the upper ones sessile and more rounded;  $\frac{3}{4}$ -1 ft. l.  $1\frac{1}{8}$ - $2\frac{1}{2}$  w. Margins somewhat repand or crenate in the outer part. *Primary Vein* costate,  $\frac{1}{4}$ - $\frac{1}{3}$  in. apart connected by arched transverse veinlets forming numerous areolae from the angle of which a central veinlet runs toward the margins, connecting or not the arches. Fertile fronds much reduced, on longer petioles, pinnae distant, 3-5 in. l.  $\frac{3}{4}$ -1 in. w. *Sori* amorphous covering the whole under surface.—Journal Bot. p. 100, 1887. *Heteroneuron menisioides*, Fée, *Hist. des, Achrostichees*, pl. 55, fig 4.

Trinidad and Guiana, Fendler, n. 88. Eaton in working out Fendlers' Trinidad Ferns placed this in *Meniscium*, with which the venation entirely agrees, differing by the dimorphic fronds and amorphous sori. It may be a variety of *M. macrophyllum* modified by these characters.

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53. *A. nicotianæfolium*, SWARTZ.—*Rootstock* ligneous, free creeping paleaceous. *Stipites* apart, erect, 1-2 ft. l., dark scaly at the base, light brown. *Fronde*s erect,  $1-1\frac{3}{4}$  ft. l.,  $\frac{3}{4}$ -1 ft. w., composed of a large terminal pinna and 2-4 pair of smaller erecto spreading lateral ones, which are oblong or ovate lanceolate, acuminate rather rounded or sub-cuneate at the base and stipitate 6-10 in. l.,  $1\frac{1}{2}$ -3 in. w., even or somewhat repand or sinuate light or dark green, chartaceous naked. *Veins* copiously areolated, areolae very fine, with stronger transverse, arched veins connecting the primary costate series, fertile fronds on long stipites, the pinnae greatly reduced.—Pl. Fil. t. 115. Sl. Hist. t. 39. Herb. p. 84. *Gymnopteris*, Bernh. *G. acuminatum*, Willd. Garden Ferns, t. 26.

*A. saxicolum*, JEN.—*Rootstock* ascending. *Stipites* and rachises fibrillose, texture thinner, fertile pinnæ larger and usually rather more in number.

Jamaica; common in woods and forests among the lower hills; variable in the number of pinnæ and size of the fronds. The type creeps horizontally under ground, while *A.* which has a darker colour is more generally scaly, with more decidedly oblong, rather than ovate, former barren lateral pinnæ and somewhat larger fertile ones, grows above ground ascending the sides of rocks, or stumps. Both are equally common on the mainland.—Cuba to Amazon Valley.

54. *A. alienum*, SWARTZ.—*Rootstock* free creeping, scaly. *Stipites* erect scattered, 1–1½ ft. l., descending fibrillose below, light brown. *Fronde* 1–1½ ft. l., ½–1 ft. w., pinnate, with a pinnatifid and lobed acuminate upper part; pinnæ several erecto-spreading, oblong lanceolate acuminate the lower ones stipitate, the apex adnate and decurrent on the rachis 6–8 in. l., 1–2 in w., roundly lobed on each side, the lowest pair often pinnatifid and enlarged on the inferior side; membranaceous and pellucid naked, dark green; costæ and ribs prominent beneath areolæ copious, angular, a line of narrow arches along the costæ on each side devoid of included small meshes no stronger transverse veins; fertile fronds on longer stipes similar in form but the pinnæ much reduced and less lobed, or occasionally entire.—Pl. Fil. t. 9 and 10, Hook. Gen. t. 85, *Gymnopteris* Bernh.

*A. flagellum*, JEN.—*Fronde* larger, upper part much prolonged into a distantly pinnatifid or lobed and winged tail which is viviparous at intervals pinnæ more numerous and deeply cut.

*b. var. G. semipinnatifida*, FÉE—Pinnæ 2–4 to a side, 2–4 in. w., entire crenate sinuate, or the lowest pair lobed in the underside and forked with a large depending inferior segment; terminal pinna usually tri-lobed, texture thicker; fertile fronds reduced, but conform in shape of the pinnæ.

Frequent in the Eastern Parishes, of Jamaica on rocks by streams or in very moist forests, among the lower hills up to 1,000 or 1,500 ft. altitude. A highly variable species of usually membranous texture, dark, cloudy green colour, but unmistakable in all its forms.—West Indies to Peru.

55. *A. præstantissimum*, BORY.—*Rootstock* erect. *Stipites* erect, strong, glabrous. *Fronde* pinnate sub-coriaceous, glabrous, dark green, 2–4 ft. l., 1–1½ ft. br. *Pinnæ* numerous spreading acute, even-edged, the base rounded and sessile, 6–10 in. l., 1½–2 in. b. *Rachis* strong, naked. *Veins* forming copious angular areolæ directed to the margin. Fertile fronds pinnate, pinnæ more or less distant, contracted, linear 3–5 li. w., the base sessile, the apex pointed, sori covering the under surface, or occasionally forming a broad sub-marginal line.—Syn. Fil. p. 423. *Neuracallis*, FÉE.

Dominica; gathered by Dr. Imray. A larger species than either of the two, preceding with longer stipes and more numerous longer broader pinnæ. Occasionally a frond presents a modification between the sterile and fertile, with the sori forming a sub-marginal band as in *Tenitis*.—Guadeloupe, West Indies.

56. *A. serratifolium*, MERT.—*Rootstock* strong, ligneous, repent, paleaceous. *Stipites* approximate, erect, 1–1½ ft. l., scaly at the base, stramineous. *Fronde* simply pinnate 1½–2 ft., ½–1 ft. b., composed of terminal pinnæ and numerous spreading, contiguous or sub-distant similar lateral ones 4–8 in. l., ¾–1½ in. br., linear-lanceolate acuminate, the base rounded and sessile, chartaceous pellucid, glabrous dark-green, the margins crenate within, serrate in the outer part. *Veins*

areolate, primary branches costate, series of areolæ largest, the rest directed to the margin to which the final branches run. Fertile fronds on longer stipes reduced, pinnæ distant, 2-3 in. l.,  $\frac{1}{4}$ - $\frac{1}{2}$  in. w., the end obtuse.—Syn. Fil. p. 423.

Guiana; infrequent in moist forests. Distinguished from the preceding by its shortly repent terrestrial rootstock, sessile less deeply serrate pinnæ and costate primary veins, which run parallel about two lines apart toward the margins, and the broader pinnæ of the fertile fronds.—Mexico, Venezuela, to Brazil and Peru.

57. *A. Raddianum*, KUNZE.—*Rootstock* ligneous, thick as a quill wide creeping, slightly scaly or puberulous. *Stipites* contiguous or scattered, 6 to 8 in. l, slightly paleaceous—puberulous at the base. *Fronde*s  $1\frac{1}{4}$ -2 ft. l.  $\frac{3}{4}$ -1 ft. w. simply pinnate. *Pinnæ* patent, linear-oblong acuminate, subdistant or distant, a dozen more or less at a side, 6 in l.  $\frac{3}{4}$  in. w. the lower ones stipitate and rounded or sub-cuneate at the articulated base, not reduced, the upper three or four pair sessile, and reduced, with a similar terminal one, chartaceous pellucid, naked, dark glossy green. Margins dentate-serrate in the outer half or third, entire or crenate within. *Veins* directed to the margins not costate, areolated, costal series largest, those outside becoming gradually smaller, not reaching the margin. Fertile fronds pinnate; pinnæ linear, pendent,  $1\frac{1}{2}$  li. w. 4-6 in. l.—Syn. Fil. p. 423. *Polypodium Guianense*, AUBLET.—*Heteroneuron*, FÉE.—*Neurocallis*, MOORE.

Guiana; common in forests of the upper Pomeroon and Isorooroo rivers, ascending the trunks of trees several or many feet. In habit and circumscription this agrees with *A. sorbifolium* but the freely reticulated venation readily distinguishes it, and the pinnæ of the fertile fronds are longer, pliant and pendant. Brazil.

58. *A. aureum*, LINN.—*Rootstock* stout, erect, solitary or in masses, forming large elevated clumps paleaceous on the crowns. *Stipites* caespitose erect ligneous, naked above the paleaceous base,  $1\frac{1}{2}$ - $2\frac{1}{2}$  ft. l., straight or somewhat flexuose, flattish, channelled impressed laterally with pale green vertical streaks and having two or three alternate pairs of black indurated spinescent spurs. *Fronde*s erect, stiff very coriaceous, glossy light green simply pinnate, oblong lanceolate 3-4 ft. l., 1- $1\frac{1}{2}$  ft. w., pinnæ more or less distant, erecto-spreading converging forward, a dozen less or more to a side and a similar free terminal one 6-10 in. l.,  $1\frac{1}{4}$ - $1\frac{1}{2}$  in. w., obtuse or emarginate apiculate, cuneate at the base and petiolate, black and indurated in the acute axils, pellucid cartilaginous-edged, the superior fertile throughout the lower half or two-thirds as uniformly barren. Venation translucent, areolæ fine, directed at an oblique angle to the margins. Sori covered by amorphous corpuscles which are peltate and obtusely angular or radiate, coffee coloured and finally displaced by the bursting of the sporangia.—Pl. Fil. t. 104, Sl. Herb. p. 50, *Chrysodium vulgare*, Fée.

Abundant in lagoons and other wet places, preferring alluvial littoral situations and brackish water. This is the true typical species in which the fructification is uniformly confined to the upper pinnæ only of the fronds and the corpuscular covering of the sporangia is coffee coloured, the individual corpuscles being, variably club shaped. A stiff ligneous, coriaceous species, once much regarded by herbalists according to Sloane.—Widely distributed in Tropical Countries.



59. *A. lomarioides*, JENM.—*Rootstock* erect, massive, paleaceous; *Stipites* cæspitose, erect stout, subfleshy  $1\frac{1}{2}$ – $2\frac{1}{2}$  ft. l.  $\frac{1}{2}$  in. or more thick, ribbed longitudinally, subangular naked, except a few basal scales arising from the caudex; *Fronde*s erecto-spreading pinnate, 3–4 ft. l. 1–2 ft. w. a little reduced at the base suddenly so at the apex, coriaceous light or dark green, naked. *Pinnæ* patent (24–30) to a side, close or crowded, the face turned up and transverse with the rachis slightly petiolate or quite sessile  $\frac{3}{4}$ – $1\frac{1}{4}$  ft. l.  $1\frac{1}{2}$ –2 in. w. the base cuneate the apex acute, margins even undulately repand cartilaginous-edged. Venation translucent, areolæ very fine, oblong, directed to the margins. Fertile fronds quite erect much taller on stouter, more fleshy and longer stipites; corpuscles primrose darker with age, sausage-shape pale and translucent. *Chrysodium*, JENM., in *Timehri*, Vol. IV part 2. *A. aureum*, LINN, Eat. Fern. N. Am. p. 58.

Bermuda, a much larger species than the last of shuttlecock-habit, the sterile fronds shorter spreading on the exterior, the fertile taller, and erect in the centre. It is marked by numerous distinguishing characters from the last with which it has been long confounded, the more obtrusively obvious of which are its much larger size; numerous crowded fronds, the barren and fertile being uniformly separate—all the pinnæ of the one being barren and all of the other fertile, much more numerous sessile leaflets (turned transversely with the rachis the plane to the sky like the blades of a step-ladder) and the intestiniform translucent pale coloured corpuscles covering the sporangia which give a pale primrose colour to the soriferous under surfaces. As indicated above, this is the plant figured in Eat. Fern. N. Am. for *A. aureum* though true *aureum* is also found in Florida. It ranges from Florida and the Bahamas down through the West Indies and Guianas to Brazil.

*Non numero*.—*A. Cænopteris*, KZE.—*Rootstock* stout, wide creeping, paleaceous stipites strong erect, scaly, at the base, wood-brown,  $1$ – $1\frac{1}{2}$  ft. l. *Fronde*s dimorphous barren pinnate passing into a pinnate entire terminal part truncate, coriaceous, naked, paler beneath,  $1\frac{1}{2}$ –2 ft. l., 8–12 in. w., pinnæ entire patent 6–8 in. l.,  $1$ – $\frac{3}{4}$  in. w., oblong-lanceolate, acuminate faintly serrated with wide appressed teeth obliquely rounded at the sessile or slightly stipitate base. *Veins* pinnate, the opposite branches united and running to the margin. Fertile fronds bi-tripinnate on longer stalks pinnæ 6 in. l.,  $\frac{3}{4}$ –1 in. w., pinnulæ tortulose the lobes interrupted the sori grouped thereon. *Polybotrya serrata*, Bory, *Soromanes dentatum* and *serratifolium*, Fée. *Acrostichees*, pl. 43, *A. Hartii*, Baker in An. Bot. Vol. 5, 1891.

Trinidad a remarkable sub-genus, the venation being exactly that of *Goniopteris* and *Eunephrodium*. The fertile fronds resemble closely those of *Aspidium menisoides* except that the top is pinnatifid instead of ending in a free entire pinna; the fertile segments are like those of *Polybotrya*, *omundacea*, interrupted in base-like lobes.—Trinidad.

Described from specimens in Trinidad, Herb.

*Ed. Note*.—The above species was left unplaced by Jenman and considering its somewhat doubtful character, it is thought best to place it at the end of the end of the genus, until its identity is confirmed by further collections.

*In recent Jamaica Bulletin Jenman's name for No. 59 is said by Maxon to be invalidated by an earlier application of the same name by Bory and he substitutes Acrostichum excelsum Maxon as the new name for this species.—(See his note quoted from Jamaica Bulletin, March 1906.)*

*Acrostichum excelsum* non. nov. Maxon.—In the first fascicle of Christensen's Index Filicum (1905), *Acrostichum lomarioides*, Jenman, a middle American species, is reduced to *A. aureum*, L., supposed to be dispersed generally throughout the tropics.

In first proposing *lomarioides*, Jenman suggested that *A. aureum* might prove an aggregate of several more or less closely related species; and arguing from analogous cases we judge this to be likely. But at present we are concerned only with *lomarioides*, described at length by Jenman, this and *aureum* he held to be as distinct as "any two closely allied species in any genus." Several recent writers have not held to this opinion, but from field observation and the collection of adequate material we are quite convinced that the two are, as Jenman has said, absolutely distinct, and we shall try to prove this conclusively in a later paper.

Jenman's use of *lomarioides* for an American plant is, however, invalidated by the earlier application of the same name to an East Indian species, by Bory\*. In its stead we propose, with the same type.

*Acrostichum excelsum* non. nov. *Chrysodium lomarioides*, Jenman, *Timehri* 4, 314, 1885.

*Acrostichum lomarioides*, Jenman, *Bult. Bot. Dept. Jamaica* II. 5, 154, 1898.

Not Bory, *Belang, Voy. Bot.* 2: 21 pl. 2, 1833.

The type of Jenman's species is from British Guiana, but the plant occurs also in Jamaica, Porto Rico, Florida, Mexico and Guatemala.—*Jamaica Bulletin*, March, 1906.

ED. NOTE.—The specific name *lomarioides* appears to have been used by Blume. (*Syn. Fil.* 423, No. 122.)

#### TRIBE XIV.—GLECHENIÆ.

*Sporangia* sessile, globose or sub-globose having a broad complete transverse equatorial jointed band; eventually bursting on one side from top to bottom; *Sori* superficial on the back of the veins punctiform composed of few or several sporangia. *Involucres* none.

The principal characters which distinguish this tribe are sporangia sessile, globose, ring horizontal, equatorial, the rupture vertical. The physiognomy, general habit, and manner of develop of the fronds are also singular. There is only one American genus.

*Sporangia* 3-5 in each sorus.

*Pinnæ* dichotomous flabellately forked.

*Fronde*s densely tomentose beneath.

1. *G. pubescens*, H.B.K.

*Fronde*s paleaceous.

2. *G. furcata*, Spreng.

3. *G. Matthewsii*, Hook.

*Vestiture* scant or none.

4. *G. longipinnata*, Hk.

5. *G. æquilaterale*, Jenm., n. sp.

*Pinnæ* not dichotomous but regularly pinnatifid in branching.

6. *Bancroftii*, Hook.

*Sporangia* 12 or less in a sorus rachises zigzag.

7. *G. dichotoma*, Willd.

8. *G. pectinata*, Prl.

## GENUS XXXVII.—GLEICHENIA, Smilt.

*Fronds* with distant opposite lateral pinnæ, which spread at a wide angle from the stiff erect, and often sub-scandent stems. *Sori* pinnatifid superficial medial on the veinlets. *Sporangia* 3-12—(rarely more) to a group. *Veins* forked, free; *Pinnæ* in most cases repeatedly forked and flabelliform, having scaly or leafy axillary buds: *pinnulæ* ultimate branches pectinate.

A well marked group of plants of singular habit and communal proclivities, diffused very abundantly throughout the West Indies and Guiana, from the lowest to the highest elevations covering roadside banks and extensive tracts of open land and not very densely shaded forest, where they form entangled and hardly penetrable thickets, and in open situations monopolise the entire possession of the ground. In all the species the rootstock is slender, wide extending and branched and runs under the surface of the soil. The fronds arise at intervals on its axis. They have slender but stiff, more or less glossy stems about as thick as a quill, from one or two to several feet long, to the upper part of which the branches or pinnæ developed in opposite pairs, are confined. In most of the species here included, the sori often presents a diffused character from the varying number of capsules to each group. They are about a sixth of the entire number known which are spread through the tropics of both the old and new worlds, and extending into the warmer regions of the Southern Hemisphere.

1 *G. pubescens*, H.B.K.—*Stipites* and *Rachis* strong, deciduously furfuraceous, or paleaceous. *Pinnæ* in 1-4 distant pairs, dichotomous, the primary petioles 2-5 in. l., scariously margined, with a few shortened leaf-segments at the base on the inner side only reaching a third or half-way up, or entirely devoid of any, deciduously furfuraceous or paleaceous; secondary petioles lined with leaf-segments throughout or a few absent only on the outer side. *Pinnulæ* pectinate,  $\frac{3}{4}$ -2 ft. l.,  $1\frac{1}{2}$ -3 in. w., broadly divaricating, rigid, gradually tapering outward, ultimate segments linear,  $\frac{3}{4}$ -1 $\frac{1}{2}$  in. l., 1-2 li. w., obtuse or acute expanded, and contiguous at the base; the upper side naked or deciduously furfuraceous, especially on the costales; beneath, very densely coated with a thick layer of rusty or grayish felt-like tomentum, the costules naked or paleaceous, the margins flat or reflexed. *Veins* once forked; *Sori* copious; *Sporangia* 3-5 in a group immersed and more or less concealed in the tomentum. *M. ferruginea*, Desv. *Mertensia immersa*, Klf.

Jamaica; general throughout the country, forming thickets in open and half open situations from sea level up to 5,000 or 6,000 ft. altitude. Readily recognised by means of the undercoating of dense fur-like tomentum and long rigid tapering pinnæ. The vestiture of the stems and rachises varies considerably. The Jamaican specimens being mostly naked. The colour of the tomentum varies too from grey to rufus. The large states are often mistakingly ascribed to *G. longipinnata*, Hook. *Mertensia*, Klf., a quite distinct plant founded on Hostman n. 228.—Guiana, Tropical America.

2. *G. furcata*, SPRENG.—*Stipites* and *Rachis* strong, the immature clothed with ragged rufus scales, that ultimately become pale and drop away. *Pinnæ* in two or three pairs spreading fan-like the ends of the pinnulæ drooping, repeatedly dichotomous; primary petioles devoid of leaf-segments as are also the secondary, but more or less clothed with red laciniate scales. *Costulæ* scaly beneath, and rusty-tomentose above; *pinnulæ* acuminate 6-12 in. l. from the fork  $1\frac{1}{4}$ -2 in. w., ultimate segments linear close and parallel,  $\frac{3}{4}$ -1 $\frac{1}{4}$  in. l.,

1-1½ li. w. naked above, but with very minute scattered grayish stellate scales beneath. *Veins* once forked. *Sori* not plentiful. *Sporangia* 3-4 pl. Fil., t. 28. *Polypodium* Sw. *Mertensia furcata*. W.

Jamaica; common in the mid region of the great mountain range above and below 4000 ft. altitude in forest and on more or less open banks and waysides; distinguished from the preceding by the plentiful rufous scales, its more repeatedly dichotomous pinnæ, narrower and closer ultimate segments, which too are absent from the petioles of the primary and secondary divisions and unmistakably by the undercoating of matted tomentum which characterises that species. When growing in the open, the scales contribute a feint aureous tinge to the leafage, by which it may be recognised at a distance. The opposite pinnæ spreading from and laterally toward each other, with the ends of the pinnulæ drooping are together quite umbrella-like in form. The texture is rather brittle, and both the pinnulæ and segments of old leaves are often much broken. The segments are usually somewhat irregular in length. This by its more repeated branching is the most leafy of the associated species. Spread from the West Indies to Guiana and Brazil.

3. *G. Matthewsii*, Hook.—*Stipites* and *Rachis* strong, dark brown deciduously paleaceous; *Pinnæ* in two or three spreading pairs, repeatedly dichotomous; primary petioles usually lined on both sides at the base with leaf-segments; secondary ones lined thus throughout; *Pinnulæ* 6-10 in. l. ½-1 in. w. naked on both sides, beneath slightly glandular and subglaucous. *Gemmæ* foliaceous, and with the petioles and costulæ densely clothed with chestnut coloured lacinate-edged acuminate brown-based scales; the *Costulæ* only so beneath; ultimate segments rather bluntish or acute ¼ over ½ in. l., 1-1½ li. w. the edge often revolute. *Veins* once forked. *Sori* sparse; *Sporangia* 3-4 in a group. Hook sp. Fil. p. 9 t. 7. B. *Mertensia farinosa* Klf.;

Jamaica; exceedingly abundant along the ridges and higher slopes of the Blue Mountain range ascending the highest peaks, where it forms dense thickets. It is separated from *G. furcata* by its smaller and less compound pinnæ, which are more copiously clothed with scales, and more glandulose by the absence of stellated scattered scales on the underside of that species and by the presence of the leaf segments at the base of the primary petioles. The presence or absence more or less of this petiolar leafage is a good though slightly variable character, in distinguishing, one from another, this and the two preceding species. The scales of the stems are appressed and more or less imbricated, especially about the nodes and buds but deciduous. The outer pinnulæ are much more curved generally than in either of the allied preceding species, of which character the inner ones in a lesser degree often partake. There is a broader and narrower form a variation which perhaps may be due to difference in altitude. The latter, in which the ultimate segments are only ¼ in. long, and the edges revolute comes near *G. revoluta*, H.B.K. for which species a specimen, gathered by Purdie in January in 1843 on the top of Blue Mountain Peak was mistaken, and is so ascribed in Hooker and Bakers' Syn. Fil.—San Domingo spreading from Mexico and the West Indies to Peru.

4. *G. longipinnata*, Hook.—*Stipites* and *Rachis* nearly or quite naked, stramineous or brown; *Pinnæ* in one or more tiers, dichotomously forked, primary petioles short, less than an inch, lined on one side with short leaflets. *Pinnulæ* 1½-2 ft. l., 2½-3 in. br., uniformly pectinate, reduced at the base and tapering in the outer part. *Segments* very numerous, horizontal close, slightly wider at the base obtuse or subacute at the point; linear 1¼-1½ in. l., 1½ li. w., rigid in texture, glaucous beneath and pubescent, the costæ on both sides clothed with ferruginous ragged stellate scales. *Veins* once forked,

*Margins* rather reflexed or revolute. *Sori* copious rather nearer the midrib. *Sporangia* 1-5 in a group. Hook.—Sp. Fil., Vol. I, p. 9, *Mertensia*. J. W. Sturms in Flora Brazil.

Guiana; Hostman n. 228, gathered in Surinam. I only know this species from Hostman's specimens at Kew, upon which Sir W. Hooker founded the name, but where it is confounded with the larger states of *pubescens* one of which is mounted with it (Funcke 814) from which, I have said under that species, it is quite distinct. It is marked by the very long pinnulæ, short petioles, the reduced segments which line them on one side only and the character of the vestiture.—Endemic.

5. *G. æquilaterale*, JENM. n. sp.—*Stipites* and *Rachises* slender, naked, glossy stramineous, wood or dark-brown. *Pinnæ* spreading in 1-2. 3 distant opposite pairs, once or twice forked, usually only once. *Petioles* slender, stramineous or brown, as are the costæ 3-6 in. l. uniformly furnished on both sides throughout with unreduced spreading leaf segments which are  $\frac{1}{4}$ - $\frac{1}{2}$  in. apart but connected by the face of the petiole being slightly margined between, foliaceous in the axil. at the base. *Pinnulæ* 1-1 $\frac{1}{2}$  ft. l., 2-4 in. w. tapering in the outer part, narrowed on the inner base gracilous, light green slightly glaucous beneath, membranous-chartaceous, glabrous or with minute ferruginous lacerated scales beneath at first. *Segments* spreading, linear, obtuse, the edges slightly reflexed or revolute 1-2 in. l., 1 $\frac{1}{4}$ -1 $\frac{1}{2}$  li. w. the base very slightly dilated, 2-4 li. apart but connected by the face of the very slender costule being margined between. *Veins* once forked. *Sori* medial on the anterior veinlet *Sporangia* usually 1-4 to each.

Guiana; in forest on the banks of the upper part of the Demerara River. Jenman n. 4149, collected first by Drake, and communicated to Kew by the late W. H. Cambell. It is distinguished by its very slender stems and rachises, long broad, gracilous, pinnæ which are usually once forked, the base petiole below the furcation being (2-4 in.) long and furnished constantly on both sides with segments its whole length, which are as long as those of the pinnules. *M. pedalis*, Klf. is ascribed to Guiana by Schomburgh, but it seems to be confined further south and to the Western side of the Continent.—Endemic.

6. *G. Bancroftii*, Hook.—*Stipites* and *Rachises* strong glossy, naked with one or two (usually one) pair of long oblong acuminate pinnæ at the top which extend at right angles arch-like; terminal bud densely clothed with linear acuminate light brown scales; *pinnæ* bi-pinnate, 3-5 ft. l., 15-20 in. w. pinnulæ close and very numerous, spreading at right angles and parallel, 6-10 in. l., 1-1 $\frac{1}{2}$  in. w., sessile acuminate; ultimate segments close, linear acute, the edges often reflexed,  $\frac{3}{4}$ -1 in. l., 1-1 $\frac{1}{2}$  l. w., the inferior ones free and subcordate at the base on the upper side, adnate and shortly decurrent on the lower, *Costæ* with two raised light coloured marginal lines down the face, surface glabrous pale-green above glaucous beneath; texture rigid. *Veins* once or rarely twice forked; *Sori* sparse or copious; *Capsules* 3-5 in a cluster. *Receptacle* ciliate with a few lanate scales. *Mertensia glauca jamaicensis*, Swartz. *M. Bancroftii* Kze. Pl. Fil., t. 25.

(A.) var., *gracilis*, Jenm. *Pinnæ* 1-2 ft. l., pinnulæ finely pectinate,  $\frac{1}{2}$  in. w.

Jamaica; very abundant on the skirts of forests and more open places at 5,000 to 6,000 feet altitude. A fine well marked species of singular habit not to be confounded with any of the rest included here. Generally it has only

one pair of pinnae which spread like outstretched arms on opposite sides at the top of the petiole. There is a form in which the segments extend into a pectinate state like the normal pinnules. In Hook and Bak., Syn. Fil., this is included with the old world *G. longissima*, Blume.—Mexico and Tropical America.

7. *G. dichotoma*, Willd.—*Stipites* and *Rachises* naked. *Pinnae* in two or three pairs, flabelliform, repeatedly dichotomous, having in addition to the axillary foliaceous tracts a pair of divaricated, deflexed basal pinnulae with serrated or subentire points subtending the forks, uniformly pectinate, but much shorter than the primary pinnulae the latter 6–10 in. l.,  $1\frac{1}{2}$ –2 in. w. petioles slender not flattened or margined on the face and naked, ultimate segments  $\frac{3}{4}$ –1 in. l.,  $1\frac{1}{2}$ –2 l. w. at the dilated and slightly connected bases, the margins slightly reflexed or revolute obtuse or acute and marginate at the point; surfaces naked pale green above; glaucous beneath. *Veins* 1–3 times forked. *Sori* copious. *Sporangia* 12 or less in each cluster. *Mertensia*, Willd. *Dicranopteris*, Bernh. Sl. Herb. p. 168.

Jamaica; abundant in situations from the lowlands up to 5,000 ft. alt. but not so common and generally diffused as *pectinata*. Its more compact habit strictly and uniformly twice or thrice dichotomous pinnae with the pair of deflexed accessory inferior pinnules to each fork unmistakably mark it.—Trinidad, Guiana and Tropical America.

8. *G. pectinata*, Pr.—*Stipites* and *Rachises* naked. *Pinnae* in two or more laxly extending pairs 1–2 ft. l. with distant alternate branches which are once forked, or the inferior ones again branched with similar forked pinnulae; Petioles slender, cartilaginous margined, devoid of leaf segments but usually with foliaceous tracts in the axils at the base; pinnulae 6–10 in. l.  $1\frac{1}{2}$ –2 in. w. linear-lanceolate acuminate outer side, wider at the base than the inner, which is usually somewhat reduced there; ultimate segments linear, bluntish emarginate, 1– $1\frac{1}{2}$  in. l. 2 l. w. at the rather dilated and connected bases; pale green above glaucous beneath, naked or slightly rusty tomentose on the veins. *Veins* 2–3 times forked. *Sori* usually not plentiful. *Sporangia* in clusters of 12–(13) or less; Hook. and Grev. Icon. t. 14. *Mertensia* Willd. *Dicranopteris* Bernh.

Jamaica; generally diffused among the lowlands, and ascending to nearly 6,000 ft. elevation. Much more common than its ally *dichotoma* to which it bears a general resemblance but is clearly distinguished by habit. Its chief features are the long lax pinnae the branches of which are arranged alternately, slender petioles flattened on the face and slightly margined by cartilage and the absence of the axillary pair of pinnulae which subtend the forks of that species. There is an intermediate form common about Mt. Moses, Jamaica, broader, with the habit generally of *pectinata*, but approaching *dichotoma* by a tendency to develop a pair of deflexed basal pinnulae.—West Indies and Tropical America.

#### TRIBE XVI.—CERATOPTERIDEÆ.

*Sori* linear or interrupted, on the longitudinal veins, diffuse; *Sporangia* sessile, rather large globose, very fragile, having a broad rudimentary or more or less extended or complete striated vertical ring splitting at length cross-wise; *Spores* rather large, granular.

This is a singular division of very doubtful affinity represented by a single anomalous species. I follow Eaton in placing it after *Gleicheniaceae*. It is marked from any other, by the globose sessile capsules having to some extent a broad vertical band.

## GENUS XLII.—CERATOPTERIS, Brong.

*Sori* linear, in one to two rather irregular rows; *Receptacles* formed of the longitudinal distantly connected veins, upon which the sporangia are laxly arranged, or scattered, and covered by the membranous reflexed conniving indusæform margins; fronds herbaceous, barren and fertile difform.

The linear sori covered by membranous margin which forms adventitious involucre, might seem to ally this genus with *Pteridia* from which however the character of the sporangia distinctly removes it. The only representative is a widely spread and variable acaulescent aquatic plant.

1. *C. thalictroides*, BRONG.—*Stipites* several, springing from central scaly buds, which by adhesion form the short herbaceous rootstock, ribbed with rather large longitudinal air vessels; *Fronde*s, herbaceous, light grass-green, of two kinds, the barren 3-6 in. each way, roundly lobed or pinnatifid, viviparous in the axils; the veins freely reticulated, the stipites short, the fertile 6-18 in. each way on stipites 6-10 in. l., decomposed, triquadri-pinnatifid, ultimate segments linear-convolute, but flattened, divaricating, a line or less wide, and 1-2 or 3 in. l., the margins conniving beneath over the sori. *Veins* in narrow longitudinal areolæ. Eat. Jour., n. Am. Fil., *Parkeria pteroides*, H.K. and Gr. Ic. Fil., t. 97. (For the numerous generic and specific synonyms see H.K., sp. Fil., Vol. 2, pp. 234 and 235.

Jamaica; frequent in still shallow waters of the Central and Western parishes. The sterile fronds are prostrate and rest upon the surface of the water or mud, the fertile are erect, or erecto-spreading held up clear of the water, and while the former are leafy and more or less subentire the latter are much divided, all the parts being narrow and linear or acicular. A transverse section of the stem shows numerous vascular bundles mainly arranged at intervals on the outside, with abundant intervening air channels. It possesses great fecundity, and multitudes of spores germinating on moist surfaces where the great majority eventually perish from lack of water. It also grows from the axillary buds which are produced by both kinds of fronds though chiefly by the barren, those of which too, develop more constantly into leafage. Young barren plants are often nearly covered by the pale developing plantlings sprung from the surface buds. Distributed through most tropical countries and extending over this belt to both the North and South warm temperate Zones.

## TRIBE XVII.—OSMUNDACÆ.

*Sporangia* crowded on the spikelets of contracted branchlike pinnae, or on the veins of the underside of normal ones; shortly stipitate, globose, reticulated, splitting vertically on one side when mature into open equal valves with a rudimentary transverse ring near the apex on this opposite side.

A small tribe consisting of only two genera *Osmunda* and *Todea* which are widely separated in their geographical range and beyond the agreement in the character of the sporangia, have not much in common in the physiognomy of their general features. One genus is confined to the small temperate zone, and the other principally to the north. The rudimentary state of the ring, more globose form, and the pedicellate base of the sporangia, distinguish this Tribe from the next.

## GENUS XLIII.—OSMUNDA, Linn.

Barren and fertile fronds, or portions of fronds—distinct, the former leafy, the latter mere rachises devoid of membrane, both compound. *Sori* on the final ribs in contiguous subconvolute or lobed spikelets. *Veins* free.

The few species of *Osmunda* have their headquarters and chief range in the North temperate Zone, but three or four extend to the equator and one even to the South temperate Zone. Two species are found in the West Indies both of which have a wide range, both north and south on the mainland. In all cases they are subaquatic or aquatic plants inhabiting marshes, flooded ditches or shallow ponds, the roots being flooded and the fronds held erect above the water.

Barren and fertile fronds separate.

1. *O. cinnamomea*.

Fronds fertile at the top, the inferior pinnæ barren.

2. *O. regalis*.

1. *O. cinnamomea*, LINN. —*Rootstock* upright or oblique. *Stipites* cæspitose erect,  $\frac{3}{4}$ – $1\frac{1}{4}$  ft. l., flattened at the base, glabrous. Barren fronds 1– $2\frac{1}{4}$  ft l.,  $3\frac{1}{2}$ –5 in. w., bi-pinnatifid, sub-coriaceous, light green. *Pinnæ* numerous, spreading, sub-distant in the lower part 2–3 in. l.,  $\frac{1}{2}$ – $\frac{7}{8}$  in. w., sessile and pointed at the base, the apex blunt, deeply cut throughout into rounded segments which are 2 li. w., and rather more deep, the margins faintly crenulate, the rachis strong, light brown and costæ rather flexuose and tomentose at the base; *Veins* forked, fertile fronds bi-tripinnate. *Sori* abundant, occupying completely all the pinnæ, Pinnules close 2–3 li. l. cylindrical, stipites and rachises tomentose. Pl. Fil., t. 155. Eat. Fer., N. Am., pl. 29.

Jamaica; infrequent in marshy and wet situations; gathered in Salt Pond near Guava Ridge beyond Gordon Town where it is plentiful in beds of *Sphagnum* with *Nephrodium unitum*. Distinguished from other species by the entirely separate, barren and fertile fronds.—New Grenada.

2. *O. regalis*, L.—*Stipites* erect, cæspitose from an erect simple or fasciculate rootstock, a foot more or less l. flattened at the base brown or stramineous channelled naked. *Fronds* erect about as long as the stipites, 4–8 or more in w. bi-pinnate, sub-coriaceous naked pale green. *Pinnæ* in 2 several opposite or sub-opposite pairs, sub-distant, or distant, not sessile, 3–5 in. l.,  $1\frac{1}{2}$ – $2\frac{1}{2}$  in. w. with a distinct terminal segment; *Pinnulae* opposite or alternate sessile and rounded at the base, the point obtuse-acute linear-oblong  $\frac{3}{4}$ – $1\frac{1}{2}$  in. l.,  $\frac{1}{4}$ – $\frac{1}{3}$  in. w. broadened or not toward the base; *Margins* faintly serrate; *Veins* free, twice forked close curved visible: upper pinnæ fertile divided the same as the barren ones, spikes  $\frac{1}{2}$ – $\frac{3}{4}$  in. l. sub-cylindric.—Fer. N. Am. p. 28, *O. spectabilis*, Willd.

Jamaica; the authority for the Jamaica habitat is taken from a specimen in the British Museum Herbarium collected by Rodger Shakespeare in 1777, and there ascribed to Jamaica. Shakespeare collected also on the mainland where this species is very widely and generally spread, so that the Jamaica habitat may possibly be an error originated in a transposed label, but as it is plentiful in the neighbouring island of Cuba, only the fact that it has not turned up in the close scrutiny bestowed by several collectors on the Jamaica fern during the last half century makes the locality at all doubtful. The tropical state is much dwarfer than the ordinary temperate region one, varying from half to one-fourth the size, but the cutting and physiognomy are the same. It is found usually at high elevations Temperate and Tropical regions of both Hemispheres.



TRIBE XVIII.—SCHIZÆACEÆ.

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*Sporangia* oval or oblong, sessile attached by the base or side, opening from top to bottom on the outer side, the apex rather contracted, striated and crown-like. *Sori* on distinct much contracted branches, or rarely separate fronds, naked, or concealed by imbricating scales or partly by the membranous sub-revolute margin and filamentose scales.

Of the five genera here connected, four are represented in tropical America, and three of these in the West Indies. In all its primary characters it is an exceedingly distinct tribe, the sori being generally in contracted panicles or racemose spikes, destitute of membrane, or in marginal fringes. The two genera in which this is not the case, are both monotypic, and out of the range of this flora, one being Brazilian and the other African. The sporangia are remarkable for having the ring in the form of a complete crown on the contracted apex.

Fertile appendages terminal on the fronds; capsules attached by the base; bi- or quadri-serial in linear segments, the margins of which at first more or less enclose them.

1. Schizæa.

Fertile or barren fronds or portions of fronds difform, capsules attached by the base, bi-serial on the face of naked, flattened, short, ultimate segments.

2. Anemia.

Sporangia attached by the side, solitary at the base of shell-shaped imbricating scales, bi-serial in short & gonal marginal spikes.

3. Lygodium.

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GENUS XLIV.—SCHIZÆA, Smith.

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*Fronds* with or without a distinct leafy division; fertile portions distinct borne at the apex of the rachiform frond, or fringe-like on the excurrent veins along the outer margin of the leaf blade, pinnate or pedato-digitate, the segments linear and costæform with membranous folded or sub-revolute margins, bearing 2-4 series lengthwise of small crowded capsules which are attached by the base and have long flexuose ferruginous scales mixed with them.

This is a very peculiar group, generally of stiff grass or rush-like habit, though two or three possess broad, fan-shaped lamina. They grow in shady places or deep forests, two or three of the mainland species, sometimes inhabiting, as well, the trunks or branches of trees. About twenty species are known, occupying tropical or warm temperate regions. Tropical America and Australia are the chief centres. *S. pusilla*, Pursh. Found in the pine barrens of New Jersey, U.S.A., is the only northern species.

Fertile appendages pinnate; sporangia biserial in the segments. Sp. 1-6.

Fronds devoid of a leaf blade, Sp. 1.

1. *S. incurvata*.

Blade linear or elongate-cuneate.

2. *S. fluminensis*.

Blade palmate-flabellate.

Blade dichotomously divided.

3. *S. dichotoma*.

4. *S. elegans*.

Blade entire or sub-entire.

5. *S. flabellum*.

Fertile appendages pedato-digitate.

Sporangia quadri-serial in the segments.

6. *S. pennula*.

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1. *S. incurvata*, SCHBR.—*Rootstock* short, clothed with dark brown hair-like scales, with crowded descending tomentose filamentose roots. *Stipites* densely crowded, erect, slender and wiry 6–10 in. l. channelled simple or forked, dark or blackish at the base, and ciliate, above this, brown. No blade. Fertile appendage terminal, solitary  $\frac{1}{4}$ – $\frac{3}{4}$  in. l. pinnate; segments, linear  $\frac{1}{4}$  li. w. 1–3 li. l. folded together. *Sporangia* bi-serial, mixed with hairs.—Syn. Fil. p. 429.

Guiana; plentiful and widely spread, but confined to sandy soil, growing in open or partially shaded places, forming dense upright tufts of numerous wiry rigid very slender fronds crowded together, a pair of which are usually once or twice forked without a distinct blade, with the pinnate fertile, appendage erect at the apex, the segments of which usually remain. This might be regarded as the first link in the passage to *flabellum*.—Brazil.

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2. *S. fluminensis*, MIERS.—*Rootstock* very slender, wiry erect, clothed with brown pubescence. *Stipites* few, erect wiry, 1–6 in. l. *Fronds* erect glabrous dark green, striated varying from linear-entire to cuneate elongate, with the apex more or less incised or deeply cleft  $\frac{1}{2}$ –6 or 8 li. w., 1–3 in. l., the base tapering imperceptibly into the petiole. Fertile appendages terminal, solitary on the linear—entire fronds or 2–8 according to the number of divisions of those that are cleft, pinnate, the linear segments which are  $\frac{1}{2}$  li. w. by  $1\frac{1}{2}$ –3 li. l., at first folded, subsequently patent. *Sporangia* bi-serial, mixed with brown hairs.—Syn. Fil., p. 429.

Guiana; growing in peat at low elevations on the trunks of trees. The smallest state is about 2–3 in. high, half the length of which is petiole, the other half blade, but hardly wider than the former, contracting at the apex into the base at the fertile appendage. From this state forms are found getting gradually larger, till the largest seem like reduced states of *elegans*. Its growth on trunks of trees where nourishment is scarce, would partly account for its dwarf size. It is distributed from one side of Guiana to the other, but is rather infrequent. Mr. in Thurn gathered it at Waini Falls, and I have myself met with it in two or three situations.—Brazil.

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3. *S. dichotoma*, SWARTZ.—*Stipites* tufted, wiry stiff and erect, rather rusty furfuraceous and dark coloured below, light brown above and channelled, 1–1 $\frac{1}{4}$  ft. l. *Fronds* folded or spreading flabellate, coriaceous, naked, 5–9 in. w., 3–6 in. l., repeatedly dichotomously cut into very numerous linear or acicular divisions which are  $\frac{1}{2}$ –3 in. l., and  $\frac{1}{4}$ –1 l. w., bearing terminal fertile pinnate appendages the segments of which are at first folded together subsequently open and spreading,  $\frac{1}{4}$  li. w., and 1–2 or 3 li. l., 6–12 to a side. *Sporangia* biserial mixed with brown hairs.—Syn. Fil. p. 430. Hk. and Gr. t. 17. *S. occidentale*, Gr.

(A.) var. *S. cristata*, Willd. Final divisions fewer, and 1-2 or 3. li. w.

Guiana; Mt. Roraima, Schomburgh, im Thurn, n. 100 (the type) on the slopes below the mountain and n. 85 (var. A.) in the same situation. As variable as *elegans* into which A and numerous other varying states form a passage but readily recognised by the very abundant linear or acicular final divisions.—Cuba, Venezuela to Brazil, Mascaren Isles, Asia, Polynesia and Australasia.

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4. *S. elegans*, Sw.—*Rootstock* horizontal, shortly repent, clothed with soft, hair-like ferruginous scales. *Stipites* tufted, few or several erect, strong, channelled, stramineous or light-brown above, darker at the base and deciduously scaly, furfuraceous; *Fronde*s spreading fan-like, dichotomously flabellate, 5-10 in. w., 3-6 in. d., the division wedge-shaped  $\frac{1}{2}$ -3 in. w. at the truncate outer margin, which is erose and often deeply incised, coriaceous, glossy, striated glabrous. *Veins* free, dichotomously forked; fertile appendages terminal on the incisions of the outer margin fringe-like, the segments spreading and 10-18 to a side, linear 2-3 li., l.  $\frac{1}{4}$  li. w., capsules bi-serial, mixed with undulate, castaneous hairs, Hk. and Gr. Icon., Fil. t. 54.

Jamaica; gathered by Purdie in 1844 in the Bluefield Mountains, Westmoreland, in dry, marshy woods, at 2,000 ft. altitude. The fronds are the shape of a partly folded fan, but are cut dichotomously into several parallel divisions, the fertile appendages forming a chestnut-brown fringe along the outer margin. It varies greatly in the number and breadth of the divisions of the fronds and the various forms present a gradual passage, so that all might be regarded as varieties of a single type.—Trinidad, Guiana, Brazil.

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5. *S. flabellum*, Mart.—*Rootstock* erect or sub-erect criniferous. *Stipites* tufted, few, strong, erect, deciduously furfuraceous pubescent, 1-1 $\frac{1}{2}$  ft. l., channelled. *Fronde*s coriaceous, glabrous, glossy striate, palmate, 6-10 in. w., 5-7 in. d., entire or distantly shortly incised, the broad outer margin much eroded. Fertile appendages pinnate, terminal on the teeth of the outer margin fringe-like, the segments linear at first, folded together spreading about 3 li. l.,  $\frac{1}{2}$  li. w., capsules biserial, mixed with castaneous hairs, Mart. t. 55. *Lophidium latifolium*, Rich.

Trinidad and Guiana; in forests and shady places. This is less common than the next, from which it differs by the broad entire or sub-entire blade, and (in Guiana) a rather more robust habit.—Brazil.

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6. *S. pennula*, Sw.—*Rootstock*, short, horizontal, faciated, densely clothed with dark, glossy hair-like scales, and with crowded, descending, ciliate, filamentose, wiry roots. *Stipites* very numerous and densely crowded, wiry, triquetrous, channelled, blackish and puberulous, at the base, above this brown 1-1 $\frac{1}{4}$  ft. l., destitute of a blade. Fertile appendages terminal, pedato-digitate, composed of 6-12 linear segments  $\frac{3}{4}$ -1 $\frac{1}{4}$  in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  li. w., which are at first erect and folded closely together, but subsequently more or less spread. *Sporangia* 4 serial, 2 rows on each side of the centre which is scaly. Syn. Fil., p. 430. Gr. Fl., B. W. I., p. 651.

(A) var. *S. subtrijuga*, Mart. Very slender,  $\frac{1}{4}$ – $\frac{1}{2}$  as high, fertile segments fewer and  $\frac{1}{6}$ – $\frac{1}{2}$  as long. *Actinostachys Germani*, Fée—Fil. Ant. t. 29.

Trinidad and Guiana; common in the latter country in open or little shaded sandy places forming dense upright tufts. (A) being found sometimes on the branches of trees. As in *incurvata* there is no blade whatever. The fertile appendages stand erect like the extended closed fingers of a hand pedate digitate instead of pinnatifid as in all the other species.—Brazil, New Caledonia and Seychelles.

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#### GENUS XLV.—ANEMIA, Swartz.

Barren and fertile parts difform, combined in the same frond or as separate fronds, compound or decomposed, the former laminate, the latter rachiform, paniculate, capsules attached by the base, biserial on the face of short flattened ultimate ribs, which they cover, no membrane being present. *Veins* free or united.

These are small plants, from a few inches to a foot or more high, which grow on open or shaded banks, rocks or stony places. In the majority, the fertile and sterile divisions are combined on the stem of the same fronds; in the others they form separate fronds. There are between thirty and forty species, all of which with a solitary exception belong to tropical America. They possess a striking general family resemblance, and to the least observant, form a clearly defined group known in the West Indies (where about one-third of the species belong) as flowering ferns in consequence of the paniculate form of the soriferous divisions.

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Barren and fertile fronds separate.

1. *A. aurita*.

Barren and fertile divisions combined in the same fronds, the latter paniculate.

Veins areolated.

2. *A. Phylitidis*.

Veins free.

Fronds simply pinnate.

3. *A. oblongifolia*.

4. *A. hirta*.

5. *A. mandiocana*.

Fronds simply pinnate. On the pinnæ again lobed or incised.

6. *A. tomentosa*.

7. *A. Breuteliana*.

8. *A. filiformis*.

9. *A. hirsuta*.

Fronds bi or tripinnatifid.

10. *A. adiantifolia*.

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1. *A. aurita*, SWARTZ.—*Stipites* subtufted from a shortly repent rootstock, stiff and wide, 3–6 in. l., pubescent. *Fronds* distinct, barren 4–6 in. l., 2–3 in. w., broadest at the base, and bi-pinnate, the upper part simply pinnate. *Pinnæ* close, petiolate, with 1–3 pair of lateral segments and a larger rounded terminal one.

*Rachis* channelled dark pubescent. *Pinnulae* rounded the outer sub-homboid at and somewhat lobed,  $\frac{1}{4}$ – $\frac{1}{2}$  in. or more in diameter, sub-coriaceous, pellucid slightly deciduously ciliate-pubescent on the ribs, the upper glossy; the margin dentate-crenate. *Veins* forked flabellate. Fertile fronds on much longer more slender stipites, the divisions distant, segments soriferous on the upper side, flat, pinnatifid about 2 li. w. each way. Hook. Icon. t. 903. *Coptophyllum*, Gard.

Jamaica; on calcareous rocks and dry banks at low elevations and up to 2,000 feet altitude. All the specimens I have seen were gathered in St. Ann's, and the western parishes. The rootstock is clothed with stiff black hairs. There are two or three other species belonging to this section found in the West Indies (in Cuba, Haiti and other islands near) that have not yet been gathered in Jamaica where possibly some of them may exist.—Endemic.

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2. *A. Phyllitidis*, Sw.—*Rootstock* short, upright, fibrous; *Stipites* caespitose, usually few, erect  $\frac{1}{2}$ –1 ft. l., slender, light coloured, naked, fibrillose-pubescent fronds, barren division sessile simply pinnate deltoid or oblong deltoid widest at the base,  $\frac{1}{2}$ –1 ft. l., 4–8 in. w., with a terminal entire or lobed pinna, and 4–9 pairs of spreading lateral ones which are 2–4 in. l.,  $\frac{1}{2}$ –1 in. br., cuneate or rounded at the base thence tapering to the acuminate apex, thin or papyraceous, pale, or grey-green, slightly fibrillose or pubescent chiefly on the ribs, the margins finely serrated or crenate. *Veins* very oblique freely areolated, forming long narrow meshes, panicles two, on slender stems 4–6 in. l., which they equal or exceed, cylindrical compound, the branches 1–4 in. l.—Pl. Fil. t. 156, *Anemidictyon*, J. Smith.

Jamaica; infrequent on rocks and banks up to 4,000 ft. altitude. A larger species than *hirta* with longer branches to the panicle and distinguished above all by the areolated venation, though in external aspect the two are much alike, *Plumiers'* figures are represented with free veins.—Cuba, Mexico to Brazil.

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3. *A. oblongifolia*, Sw.—*Rootstock* erect, clothed on the crown with ferruginous, tomentum; *Stipites* tufted, slender, 1–3 in. l., stramineous fibrillose; *Fronds*, barren division 2–4 in. l., 1–1 $\frac{1}{2}$  in. br., composed of few pairs of patent, oblong, or ovate-oblong opposite, entire pinnae which are  $\frac{1}{2}$ – $\frac{3}{4}$  in. l., 2–3 li. b., obtuse, the margins dentate, the base cuneate or unequal and obliquely truncate sub-coriaceous, nearly or quite naked, or the rachis fibrillose, terminal one broader. *Veins* repeatedly forked, flabellate. Panicles two, sessile 1–2 in. l., on very slender petioles. *A. humilis*, Sw.

Jamaica; gathered by Purdie according to Grisebach, probably in central (or western parishes) I have only seen Cuban specimens (Wright n. 3933) from which my description is taken. One of the smallest species of genus.—Mexico and Southward.

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4. *A. hirta*, Sw.—*Rootstock* small fibrous, erect, clothed with brown tomentum. *Stipites* tufted erect, usually few, slender, 4–8 in. l., fibrillose pubescent. *Fronds* barren, divisions sessile, deltoid oblong broadest at the base, 3–6 in. l., 2–4 in. br., simply pinnate.

with a terminal entire or lobed pinnæ, and 3-8 spreading lateral ones which are 1-2 in. l.,  $\frac{1}{4}$ - $\frac{3}{4}$  in. w., lanceolate or rounded at the sessile base, thence tapering to the acuminate or acute point, pellucid, papyraceous light green slightly pubescent or ciliate on the ribs and veins, the margin crenate; *Veins* very oblique, close, fine, repeatedly forked free; *Panicles* cylindrical 1-3 in. l. on slender pubescent stems as long or longer, the branches short and compact.—Pl. Fil. t. 157.

Jamaica; frequent on rocks and banks from the lowlands up to 4,500 feet altitude. It is often confounded with *Phyllitidis* from which its generally smaller size and free veins (though an odd pair do casually unite) distinguish it. From *Mandiocana*, its fewer pinnæ and different shape, mark it. Plumier's figure is an excellent representation of the species.—Cuba, Martinique.

5. *A. mandiocana*, RADD.—*Stipites* tufted, erect, pale, brown, pubescent or naked,  $\frac{1}{2}$ -1 ft. l. *Fronds* barren divisions pinnate, chartaceous, gray green, pubescent or glabrescent,  $\frac{1}{2}$ -1 ft. l., 2-3 $\frac{1}{2}$  in. br., oblong-lanceolate composed of a terminal pinnæ and 8-12 or more spreading lateral pairs which are 1-1 $\frac{1}{2}$  in. l.,  $\frac{1}{3}$ - $\frac{1}{2}$  in. br., serrulate, the point obtuse, acute, the base inequilateral; *Veins* forked, flabellate, oblique. Panicle petiolate, reaching to the top of the leaf.—Syn. Fil., p. 433. Gr. Fl., B.W.I., p. 650. Hook. G. J. t. 36.

Jamaica; according to Grisebach who correctly describes it, but I have only seen Brazilian specimens. It differs from *Phyllitidis* by its quite free venation, more oblong lanceolate shape of frond and more numerous differently-shaped pinnæ. Plum. Fil. t. 157, quoted, by Grisebach, does not agree with his description or with the Brazilian plant while it corresponds entirely in shape of frond and pinnæ with *Phyllitidis* except that, as previously mentioned, the veins are shown as free.—Brazil.

6. *A. tomentosa*, Sw.—*Rootstock* short, decumbent, densely clothed with long ferruginous wool-like hairs; *Stipites* tufted, erect, 1 $\frac{1}{2}$ -2 spans long, chestnut or wood brown channelled glossy ciliate. Barren division of frond oblong-lanceolate, truncate, 4-8 in. l., 2-3 $\frac{1}{2}$  w., bi-pinnatifid. *Pinnæ* spreading horizontally, oblong, sessile, base free, 1-2 in. l.,  $\frac{1}{4}$ -1 in. w., the outer part obtuse or rounded and roundly lobed, the inner pinnatifid. *Costæ* flexuose. *Segments* rounded, not toothed, the inferior often slightly lobed. Adnate decurrent except the basal pair, 2-3 l. w., 3-6 or 8 l. *Rachis* freely tomentose, surfaces, less so, rusty texture, chartaceous, dark green, veins dichotomous, flabellate in the segments, close, widest above. *Panicles* two, springing from the base, a short way below the barren division and including the petioles the same length.

(A) var. *A. deltoidea*, Sw. *Fronds* more deltoid than oblong, lower pinnæ larger, fully pinnate, with longer pinnules which are sinuate or lobed pinnules much overtopping the leaf.—Guiana, Roraima Mountain, and slopes at its base. The type was gathered by im Thurn, and the variety by Schomburgk and Appun. The species is very variable. *A. fulva*, Sw., is described in Syn. Fil. as a variety smaller and more coriaceous the barren leaf tri- or even quadri-pinnatifid the ultimate divisions much smaller and sharper. Hk. Fil. Exot., t. 26. *A. anthriscifolia*, Schred. There are numerous synonyms.—Mexico southwards, and also India.

7. *A. Breuteliana*, PRESL.—*Stipites* tufted from a small upright rootstock, slender, slightly tomentose light coloured. *Fronds*, barren division sessile 3-6 in. l., oblong-lanceolate broadest at the base,

pinnate  $2\frac{1}{2}$ -6 in. l.,  $1\frac{1}{4}$ -3 in. w., the rachis slender pale brown, tomentose fibrillose. *Pinnæ* 6-10 to a side with their own width or more between them, spreading obliquely, cuneate at the base, the point subacute or bluntish  $\frac{3}{4}$ - $1\frac{3}{4}$  in. l., 2-6 li. b., the upper ones entire the lower with one or two incisions on one, or both sides, thin, and papyraceous, pellucid, gray green, more or less ciliate. Margins finely serrated. *Veins* very close and oblique, forked, no distinct midrib only at the base of the longer pinnæ. *Panicles* two,  $\frac{1}{2}$  or  $\frac{2}{3}$  as long as their slender stipites, shortly branched and linear. *A. mandiocana*, Hook. Gen. Fil. t. 90.

Jamaica; infrequent on rocks and waysides, banks from 1,000-3,000 feet altitude or higher. It has somewhat the aspect of a weaker state of *hirta*, with the lower pinnæ somewhat incised. The pinnæ however are less pointed, rather more numerous, and more gradually decrescent from the base to the pinnatifid apex than in that species. The veins casually unite.—Mexico to Brazil and Peru.

8. *A. filiformis*, PRESL.—*Rootstock* short, densely rusty-tomentose. *Stipites* tufted  $\frac{1}{2}$ -1 in. l., rusty-tomentose. *Fronde*s, barren division sessile  $1\frac{1}{2}$ -4 or 5 in. l.,  $\frac{1}{2}$  to over 1 in. b., simply pinnate. *Pinnæ* with once or twice their own width between them,  $1\frac{1}{2}$ -3 li. w.,  $\frac{1}{4}$ - $\frac{3}{4}$  in. l., sessile and cuneate at the base, rounded and slightly broadened at the apex. *Rachis* and general surfaces, especially the under sides, rusty-tomentose; *Margins* irregular toothed or incised. *Veins* firm, close, forked, spreading, no distinct midrib; panicle single on a slender stem as long as the sterile division, which it overtops by 1-3 in. *A. humilis*, Swartz.

Jamaica; this was gathered by Purdie, but no locality is marked with his specimens, which are in the Kew Herbarium. It is nearest in relation to *hirsuta* from which it may be at once known by the single fertile division and the very short stipites.—Mexico to Peru and Brazil.

9. *A. hirsuta*, SWARTZ.—*Rootstock* small, fibrous, densely clothed with pale brown tomentum. *Stipites* tufted, slender, erect, stramineous, very slightly scaly, 2-6 or 10 in. l. *Fronde*s, barren divisions sessile, oblong or oblong-lanceolate,  $1\frac{1}{2}$ -4 in. l.,  $\frac{3}{4}$ - $1\frac{1}{2}$  or 2 in. w., broadest at the base and bi-pinnatifid, decrescent to the apex. *Rachis* straw-coloured, slender, scaly; *Pinnæ* spreading, apart,  $\frac{1}{3}$ -1 in. l., 2-6 li. w., 5-10 to a side, sessile toothed, at the rounded point: both sides deeply cut into narrow segments, which also are toothed on their blunt outer edge, papyraceous, pellucid, gray green striated finely scaly. *Veins* firm, close forked, spreading, no distinct mid-rib. *Panicles* two, compact,  $\frac{1}{2}$ - $1\frac{1}{2}$  in. l., oblong or linear-oblong on long slender petioles which considerably overtop the leaf. Pl. Fil. t. 162. Sl. Hist. t. 25. f. 6. Herb. 39. *A. dissecta*, Presl.

Jamaica; abundant on rocks and banks from the low lands up to 5,000 feet altitude. This is probably the commonest species. It is well marked by its long petioles, small much dissected fronds, and short considerably elevated spikes; small specimens are much less cut than the larger ones.

10. *A. adiantifolia*, SWARTZ.—*Rootstock* slender, creeping dark tomentose; *Stipites* erect,  $\frac{1}{2}$ -1 ft. l. slightly scaly or naked; *Fronde*s: barren divisions deltoid, usually petiolate, very variable in size from 1 in. to a foot each way, bi-tripinnate; *Pinnæ* lanceolate stipitate, gradually reduced from the basal pair to the apex of the frond;

tertiary segments (secondary in the smaller states) ovate or obovate cuneate at the base, the outer edge dentate entire or lobed, chartaceous striated, the upper side glossy, slightly ciliate beneath the rachis, costæ, &c. more so. *Veins*, fine, close, forked spreading *Panicles* two, branches open or spreading close or distant, petioles as long or shorter. Pl. Fil. t. 158. Sl. Herb. p. 38. Eat. Fer. N. Am. pl. 15. *A. Asplenifolia*, Swartz, Hooker and Grev. Icon. t. 16.

Jamaica; abundant on open banks and rocks in the lowlands and among the lower hills reaching 3,000 ft. altitude. Dominica; it is exceedingly variable in size and consequently in cutting. Some fully fertile fronds being hardly more than an inch each way while the largest are nearly a foot. In some specimens the fertile fronds are distinct from the barren as in *Coptophyllum*, but with normal fronds on the same rootstock, and in others the lower pinnæ are contracted and fertile, the upper remaining leafy, combining both states in one leaf. Usually the barren division is petioled above the point from which the fertile branches spring, but the character is only constant in larger fronds.—Mexico, Guiana to Brazil.

## GENUS XLVI.—LYGODIUM, Sw.

*Sporangia* attached by the side, lying singly at the base of shell-shaped hiserial imbricating indusiform scales, on the back of oblong or linear spikes, which terminate the excurrent veins, and forms a fringe along the margins. Barren and fertile *pinnæ* leafy, but the latter usually somewhat narrowed in the pinnules. *Veins* free or united, frond flexuose twining.

This is a peculiar genus, the fronds having slender twining stems, which ascend often 20-30 feet on trees, with distant barren pinnæ below, and fertile ones at the top either palmately or pinnately divided. There are between twenty and thirty known species, widely diffused round the world, but mostly within the tropical belt.

Pinnules entire, not auricled or lobed at the base.

### 1. *L. hirtum*.

Inferior pinnules usually auricled or lobed at the base, rarely all entire.

### 2. *L. volubile*.

Pinnules generally auricled or lobed at the base, surfaces pubescent.

### 3. *L. venustum*.

1. *L. hirtum*, KLF.—*Rootstock* dark vellose, horizontal. *Stipites* tufted, erect cylindrical straight 1-2 or more ft. l. *Fronds* several feet long, twining ascending bi-pinnate, composed of numerous pairs of distant or sub-distant spreading pinnæ, sub-coriaceous glossy glabrous or the mid rib ciliate on the upper surface the costæ slightly flexuose and margined down the surface. *Pinnules*—3-4 to a side spreading oblong—lanceolate 3-8 in. l.  $\frac{1}{2}$ - $1\frac{1}{4}$  in. w. entire, the base truncate sub-cuneate or rounded, articulated at the top of the short  $\frac{1}{4}$  in. l., margined pedicils, the apex obtuse or acute. *Veins* free, oblique, and curved; conspicuous, 2-3 times forked. *Spikes* close 6-9 to a side, 2-3 li. l., the scales 3-8 in a series, the surface of the pinnules rusty, pubescent at the base. Mart. Fl. Brazil, fasc. 23.

Guiana; common along the banks of rivers and in other situations, covering bushes and trees with exquisite drapery. It is a stronger species than *volubile* with larger pinnæ and pinnule, the latter being quite entire and not at all



auricled, lobed, or pinnate at the base, the margins more even and evenly serrated, the spikes twice as numerous, very short and with few scales, the surface rusty, villose beneath along their base and the costæ stronger and more margined, less flexuose, darker, and with shorter pedicels.—Venezuela to Guiana.

2. *L. volubile*, SWARTZ.—*Rootstock* short, with strong wiry descending roots, and densely clothed with minute black glossy scales. *Stipites* tufted, erect, straight, 2 ft. or more l. *Fronde*s several or many feet l., twining, bi-tripinnate. *Pinnæ* opposite, spreading, freely petiolate, composed of 3-4 alternate linear-oblong spreading pinnules, which are subcoriaceous, glabrous, bright green, 3-4 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. w., sub-cuneate, cordate or truncate at the base and pointed at the top of the  $\frac{1}{4}$ - $\frac{1}{2}$  in. l. pedicels which, with the slender stramineous flexuose costæ are slightly margined, and faintly puberulous-pubescent, entire, or auricled, lobed, or with a short pair of spreading pedicellate pinnæ at the base, the apex generally obtuse. *Veins* conspicuous, free, 2-3 times forked, very oblique. *Spikes* contiguous, 30-40 to a side,  $\frac{1}{8}$ - $\frac{1}{2}$  in. l, the scales 5-20 in a series. Sl. Hist. t. 46, f. 1. *Ophioglossum* Linn.

Jamaica ; plentiful from the lowlands up to 4,000 ft. altitude, twining and ascending trees 20-30 ft. high. Trinidad and Guiana ; variable in the length of the sporangiferous spikes and in the presence or absence of the pair of auricles lobes or segments at the base of the pinnules, which however are usually more or less developed in the basal pair and often petiolate. In this character it shows close affinity with *venustum*.—Cuba to Brazil.

3. *L. venustum*, SWARTZ.—*Rootstock* short, clothed with dark tomentum. *Stipites* tufted, slender, erect, 1-2 ft. l., brownish. *Fronde*s bi-tripinnate, twining several or many feet high, pellucid, chartaceous, light green, pubescent, the rachis flexuose ; *Pinnæ* in numerous opposite sub-distant or distant pairs petioled with a terminal pinnule-- and several (4-7) alternate spreading lateral ones  $1\frac{1}{2}$ -4 or 5 in. l.  $\frac{1}{3}$ - $\frac{1}{2}$  in. w. stipitate, the base cordate and expanded on each side into auricles, furcate lobes or fully separate pinnules. *Margins* serrulate. *Costæ* straight or flexuose, light brown or stramineous, margined on the face, pubescent. *Veins* repeatedly forked or fascicled evident ; *Stipites* not numerous, generally confined to the inner half or two-thirds of the pinnule surrounding the auricles, but occasionally reaching nearly to the end, 1-5 li. l. pubescent. *Scales* 4-16 in a series. Pl. Fil. t. 92. Sl. Herb. p. 100. *L. polymorphum*, H.B.K., *Ophioglossum scandens*, Linn.

Jamaica ; Grenada ; Trinidad ; Sandride forest, Guiana. It is distinguished by the generally pubescent surfaces, narrower and more numerous pinnules with a distinct terminal one nearly all of which are much expanded hastately, the auricles with a furcate tendency. The barren pinnules are often tripartite, the central segments much the longest, and the lateral ones furcate.--Mexico to Brazil. *More common in Trinidad than L. volubile and grows wild in Botanic Gardens.*—(Ed.)

## ORDER II—MARATTIACEÆ.

*Sporangia* destitute of a ring or crown biserial, free, or fused into concrete linear, oblong, boat shaped or circular masses, (syngangia) superficial or immersed in moulds, or with an inferior fimbriated involucreal membrane, and opening by slits on small round

pores. *Vernation* circinate; *Rootstock* fleshy erect or prostrate. *Stipites* enlarged and articulated at the base, which is enclosed by a pair of projecting stipuliform gills. *Fronde*s varying from simple to decompose, *Veins*, free or united.

There are four well marked genera in this order. In one *Angiopteris* the sporangia are quite free but in the others they are combined into concrete synangia. Two, *Angiopteris* and *Kaulfussia*, are exclusively Eastern and Australian, one, *Danaea* is exclusively Western and the other, *Marrattia*, is widely spread in the tropical regions of both worlds, extending South to new Caledonia and New Zealand. The individual sporangia are more or less oblong or oval in shape but variable as the blocks into which they are fused. All the species occupy wet forests, are of a dark dull colour, and have fleshy rootstock bearing large scars, the articulation of past stipites with thick cord-like roots.

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### GENUS I.—MARATTIA LINN.

*Synangia* dorsal on the veins, small, elliptical or rounded, sessile or pedicellate, bivalved opening medially across the top at maturity into a boat-shaped form, the apertures in the 2 serial sporangia transverse to the line of dehiscence and about six to a side. *Fronde*s large, decompose petioles without nodes, but articulated at the auricled base. *Veins* free.

The members of this genus occupy damp forests and are usually gregarious. The swollen caudicular points common to all the species which remain for a time on the rootstock after the fronds have perished, produce a meal something like potato-meal, which is used as food by some of the tribes of the Pacific islands. It is frequently to be seen on the rootstocks of *M. alata*.

*Synangia* sessile—Sp. 1-2.

Fronde bi-pinnate—Sp. 1.

1. *M. cicutæfolia*.

Fronde tri-pinnate—Sp. 2

2. *M. alata*.

*Synangia* stipitate.—Sp. 3.

Fronde quadri-pinnate.

3. *M. Kaulfussii*.

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1. *M. cicutæfolia*, Kaulf.—*Stipites* erect,  $1\frac{1}{2}$ -2 ft. l., thick and fleshy, scaly below, above glabrous. *Fronde*s 4-6 ft. l., nearly as wide, bi-pinnate subcoriaceous naked or with a few small scales beneath, dark green above, paler beneath. *Pinnæ* spreading,  $1\frac{1}{2}$ -2 ft. l., 5-8 in. w., petiolate the axils scaly or not. *Pinnulæ* spreading sessile contiguous or apart opposite or alternate 2-3 $\frac{1}{2}$  in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. w., acuminate—the base rounded on the inferior, slightly subcordate. *Margins* finely serrulate. *Veins* patent, free, once or twice forked. *Costæ* narrowly winged, most so in the upper part. *Synangia* uniserial shortly within the margin, sessile 1-1 $\frac{1}{2}$  li. l., the valves ultimately spreading. Syn. Fil. p. 441., *M. fraxinea*, Radd.

This has not been recorded yet from Guiana but there is little doubt it only awaits discovery within our borders. The barren pinnæ resemble a good deal the barren fronds of *Acrostichum serratifolium*, Mert., and with their large leaflets are very distinct from the two following species. The type varies much and Mr. Baker includes six other species, under this.—Brazil.

2. *M. alata*, SMITH.—*Rootstock* large and cone-like, marked with the scars of the joint like bases, of past stipites. *Stipites* 3-5 ft. l., 2 in. thick at the articulated base, cylindrical, early clothed with small very deciduous scales. *Fronde*s nearly deltoid 3-5 ft. l., and nearly as w., tri-pinnate, chartaceo-herbaceous, dark-green, paler beneath, with a few deciduous scales. *Pinnæ* spreading opposite or sub-opposite, the lowest pair largest or hardly so, 2-3 ft. l., 1-1½ ft. w. petioled and with a fleshy swelling at the base, abruptly acuminate at the apex. *Pinnulæ* numerous contiguous, oblong lanceolate-acuminate, the point sharply serrate slightly stipitate. Tertiary segments ovate oblong, cuneate at the sessile base, bluntish 4-8 li. l., 2-3 li. w., serrated. *Costæ* interruptedly winged in the outer part. *Costulæ* so throughout. *Veins* simple or forked, synangia one to each vein, a short way within the margin the valves at length spreading. *M. laevis*, J. Sm. *Discostegia* Presl.

Jamaica; very abundant, gregarious in forests at 5,000-6,000 ft. altitude, often covering extensive areas; when the petiole drops away it leaves a short point at the base with the gills adhering to it. This is viviparous in the axils of the large auricles or gills, two buds appearing above and two below on the rounded back. One only however is usually developed and this from either of the basal axils. The joints lie about plentifully and when the plantlets are strong enough they root into the ground and proceed to maturity. Reproduction seems to be carried on much more largely in this way than from spores. The whole framework of the fronds is fleshy and in drying becomes shrivelled and flat.

3. *M. Kaulfussii*. J. SMITH.—*Stipites* erect, 2-4 ft. l. stout and fleshy, glabrous at maturity. *Fronde*s 3-4 ft. l. and nearly as wide. Quadri-pinnatifid, deltoid in outline being broadest at the base, dark green, glabrous, membrano-herbaceous. *Pinnæ* spreading 1½-2 ft. l., 6-9 in. w. petiolate the costæ winged in the outer part. *Pinnulæ* apart, pinnate, or the inferior bi-pinnate, 3-5 in. l., 1-2 in. b., petiolate or sessile, acuminate the point serrated, the costalæ broadly margined with a membranous much interrupted wing. Final segments oblong or elongate-oblong, ¼-1 in. l., 2-6 li. w. sessile, the end rounded and toothed, the sides freely toothed or lobed. *Veins* free, simple or forked. *Synangia* stipitate, ½-¾-li. l. one to each vein and dentation of the margin a short way within, the valves finally spreading. Hook. 2nd Cent. Fer. t. 95. *M. alata* Raddi. t. 83-84,

This has a considerable resemblance to *alata* but it is more compound all the divisions wider apart, the tertiary segments longer and more deeply toothed, while the stipita synangia clearly distinguish it. The texture too is more membranous—Cuba to South Brazil.

## GENUS II.—DANÆA, Smith.

*Synangia* linear or oblong more or less immersed, running from the midrib to the margins on the free veins; very close and covering except the costa, the whole under surface. Sessile and broadly attached by the base each one composed of a double row of numerous sporangia fused and blocked together opening eventually by small apical pores. *Fronde*s simple or pinnate, dimorphous, the fertile

somewhat reduced. *Stipites* with or without distant nodes and articulated at the auricled base.

This is entirely an equatorial American genus and the largest of the sub-order. There is no great diversity of form in the genus, and the members differ chiefly in size and substance, number of pinnae, number of nodes to the stems, and direction of growth of the rootstock. The sporangia are biserial fused together into concrete linear synangia, which are immersed in a green or when dry, gray parchment-like substance, which surrounds them like a mold, and forms thin partitions between their sides. The sporangia are multitudinous. Moderate sized fronds of *M. nodosa* contain from 300,000 to 400,000 each.

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Fronds entire.

1. *D. simplicifolia*.

Fronds trifoliate.

2. *D. trifoliata*.

Fronds pinnate.

Stipites with 1-4 nodes.

Pinnae under 1 in. wide.

3. *D. Leprieuri*.

4. *D. alata*.

5. *D. stenophylla*.

Pinnae over 1 in. b.

6. *D. elliptica*.

Stipites devoid of nodes.

7. *D. nodosa*.

8. *D. Moritziana*.

9. *D. nigrescens*.

10. *D. jamaicensis*.

11. *D. Jenmanii*.
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1. *D. simplicifolia*, RUDGE.—*Stipites* caespitose, erect, 1-1½ spans long, somewhat furfuraceous, a simple node toward the top. *Fronds* erect or spreading, simple rarely trifoliate oblong or ovate-lanceolate, acute or acuminate at the apex, the base cuneate, 8-10 in. l. 3-4 in. br. coriaceous, dark green, naked or slightly scaly on the midrib beneath; margins even or repand. *Veins* close, horizontal simple and forked. Fertile fronds the same shape, but smaller, on much longer and more scaly stipes. Budge t. 36. Syn. Fil. p. 442.

Guiana; very abundant in moist forests in numerous parts of the Colony. The commonest of all the species. Occasionally but very rarely this is trifoliate like the next species. In this case the outer leaves of the plant are simple, having the usual node near the top of the petiole, but from this node on the inner leaves a small pair of pinnae are developed and there is no node left to the petiole.—Guiana, Trinidad.

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2. *D. trifoliata*, RICK.—*Stipites* strong 1-2 ft. l., caespitose erect, decidedly furfuraceous, with a single node toward the top. *Fronds* erect 1-1¼ ft. l. with a large oblong-lanceolate terminal pinna and a much smaller pair of lateral pinnae below it, bright green, sub-coria-

ceous, glossy slightly furfuraceous, on the mid rib beneath, the margins even or repand. *Veins* patent, close or moderately open, simple or forked. Fertile fronds similar, but reduced and on longer stipes.—Syn. Fil., p. 442.

Guiana; infrequent, but previously gathered by Hostmann, and Schomburgh, a large and stronger plant than the similarly trifoliate state of *simplicifolia*, of a lighter glossy surface with narrower and longer leaflets and a node uniformly present below the lateral pinnae by which it may always be distinguished from that form. My specimens were gathered on the higher ground in the forest behind Berbice Grove; Essequibo River.—Endemic.

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3. *D. Leprieuri*, KZE.—*Stipites* tufted erect or sub-erect, rather slender, slightly scaly, 4–8 in. l., with 2–3 nodes. *Fronde*s pinnate ovate oblong, chartaceous, pellucid, dark green, naked, 4–6 in. l., 3–5 in. w. *Pinnae* contiguous, spreading 4–6 to a side and a similar terminal one, oblong-lanceolate, more rounded than cuneate at the base, rather unequally shortly acuminated at the point,  $1\frac{1}{2}$ – $2\frac{1}{2}$  in. l. 8 li. w., the margins even or slightly crenated. *Rachis* slender and winged at the top. *Veins* once forked from the base, close, spreading at right angles. Fertile fronds similar but on longer stipites, and usually smaller.—Syn. Fil. p. 443.

Guiana; both English and French. A smaller plant than any of the following: *D. trichomanoides* Spruce, from Brazil, is still smaller with 8–12 little pinnae to a side which are  $\frac{1}{2}$ – $\frac{3}{4}$  in. l.,  $\frac{1}{4}$  in. w., rather undulate-crispate, the rachis winged fertile frond similar but longer and on longer stipes.—Brazil.

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4. *D. alata*, SMITH.—*Stipites* fleshy caespitose, erect, 6–9 n. l. Scaly throughout nodes 1–2 in. *Fronde*s 1– $1\frac{1}{2}$  ft. l., 4–8 in. w. *Fronde*s oblong, pinnate, usually rather narrower at the bottom and top, with or without a terminal pinna, beneath scaly—chiefly on the ribs, both sides rather pale green; *Rachis* fleshy, scaly narrowly winged upwards interruptedly, with a small bud at the apex, if the terminal pinna be absent. *Pinnae* 8–12 in. 14 to a side, spreading shortly stipitate, rounded at the base, or the lower ones sometimes more cuneate, the apex acute or cuspidate 3–6 l.,  $\frac{3}{4}$ –1 in. w. *Margins* finely serrate in the outer part, plain within. *Veins* very close, spreading at nearly right angles simple or forked from the base. Fertile fronds smaller, pinnae  $1\frac{1}{4}$ – $1\frac{1}{2}$  in. l.,  $\frac{1}{4}$  in. w. *Stipites* longer stouter, dark coloured without joints, more scaly.

Jamaica; frequent in very moist forests in the Eastern parishes at 2,000–4,000 ft. altitude. Marked by its interruptedly winged rachis and the absence of a terminal pinna. Sometimes a pinna appears at the side of the terminal bud. The name seems to be founded on Plumiers t. 109, which is true *D. stenophylla*, Kz. Both names are so characteristically applicable to the respective species that it seems a pity to disturb them now.

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5. *D. stenophylla*, Kze.—*Stipites* 10–18 in. l., erect, slightly scaly throughout, joints usually 3. *Fronde*s pinnate, 10–15 in. l., 5–8 in. w., somewhat narrowed both at top and bottom, naked or a

few minute scales at the base of the ribs beneath dark green above, very light beneath. *Pinnæ* spreading consisting of a terminal and nine to twelve lateral ones which are 3-4 in. l.,  $\frac{2}{3}$  in. w., shortly stipitate and cuneate—rounded, unequal and deeper on the upper side at the base—the apex acute, acuminate or cuspidate margins sharply serrated in the outer part, but plain their greater length. *Rachis* slender, light coloured beneath slightly scaly margined at the top. *Veins* close and fine, spreading at most horizontally, forked at varying points from the base outwards. Fertile fronds reduced, the pinna  $1\frac{1}{2}$ - $2\frac{1}{2}$  in. l., 3-4 li. w. Stipites longer and pointed.

Jamaica; plentiful in moist stony forests at 5,000 ft. alt. More nearly allied to *alata* than any other Jamaica species but from which the terminal pinna which is rather larger than the rest distinguish it; rachis not winged, except at the top and larger states of this approach *nodosa* closely in size, and number of pinnæ, but are readily distinguishable by the nodes in the petioles. Their number varies in the different varieties, but they are never entirely absent. Having examined in the forest a very large number of plants though the extremes are distinct enough, this character of the absence or presence of nodes seem to me the only certain character to rely upon for determining the two species. General through the West Indies, Venezuela and Brazil.

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6. *D. elliptica*, SMITH.—*Rootstock* erect. *Stipites* cæspitose erect a span to a foot l., slightly furfuraceous or at length naked, with 2-4 nodes. *Fronde* erect or spreading  $\frac{3}{4}$ -1 ft. l., and nearly as much w., composed of 3-5 pairs of lateral spreading pinnæ and a similar terminal one which are cuneate or rounded and shortly stipitate at the base, the apex acute, acuminate or cuspidate, 5-7 in. l., 1-1 $\frac{1}{4}$  in. w. or rather over, dark or light green with a few minute scales on the ribs beneath, chartaceous, margins plain within the outer part freely or faintly crenulate. *Veins* nearly horizontal, mostly forked from the base. Fertile fronds similar but reduced, on longer stipites, with 2-4 nodes. Hook. and Grev. Fern t. 51. Syn. Fil. p. 444. Gr. Fl. B. W. I., p. 649.

(A.) var. *major*.—*Rootstock* erect. *Fronde* larger, with 5-7 pinnæ to a side, 3-4 nodes to the stipes. *Veins* more open.

(B.) var. *repens*.—*Rootstock* prostrate or repent, nodes 1-2, pinnæ 4-6 to a side.

Jamaica; in moist forest often very plentiful. The jointed stem of the fertile fronds clearly distinguish it. The pinnæ are longer, and more acuminate. Sometimes the fertile. are as long as the sterile.—Guadeloupe.

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7. *D. nodosa*, SMITH.—*Stipites* erect, strong, 1-1 $\frac{1}{2}$  in. or 2 ft. l. *without nodes*, furfuraceous. *Fronde*  $1\frac{1}{2}$ - $2\frac{1}{2}$  or 3 ft. l., 1-1 $\frac{1}{2}$  ft. w. *Pinnæ* 6-12 or more spreading, stipitate and rounded or cuneate and often unequal sided at the base the apex acute cuspidate or acuminate 6-10 in. l., 1-1 $\frac{3}{4}$  in. w. very variable in shape. *Margins* usually plain within, the outer part crenulate, sometimes serrate at the point, often somewhat repand; Surfaces nearly or quite naked. *Rachis*

slightly furfuraceous. *Veins* exceedingly fine and close, simple or forked; fertile fronds similar, but the pinnae narrower.—Hooker and Grev. Icon, t. 51.

Jamaica, St. Vincent, Trinidad and Guiana; frequent in moist woods and widely distributed. Usually a large and robust species but variable in the number, size and form of the pinnae. In all states, however it may be recognized from *elliptica* by having no nodes in the petioles.

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8. *D. Moritziana*, PRESL.—*Stipites* erect, glabrescent, nodes 1-4. *Fronds* firm, dark green above glaucous beneath, conspicuously striated pinnate, 1-1 $\frac{1}{3}$  ft. l. 5-6 in. w., with a terminal segment and numerous similar contiguous lateral ones, the inferior of which are reduced or absent from the distant nodes. *Pinnae* spreading 3 in. l., barely  $\frac{3}{4}$  in. w., acute unequally cuneate at the base; the upper side being much deeper, the inferior ones stipitate and the upper sessile, obscurely crenate. *Rachis* winged only at the top. *Veins* conspicuous beneath, paralleled nearly at a right angle with the midrib  $\frac{3}{4}$ -1 li. apart. Fertile frond similar but pinnae only  $\frac{1}{4}$  in. w. and obtuse.

Trinidad; collected by Prestoe, much like *alata* and *stenophylla* but distinguished by its acute not acuminate and serrated ends of the pinnae rather thicker texture glaucous underside and reduced inferior pinnae which are sometimes absent, at the distant nodes, the absence or presence of which determine the number of nodes to and length of the petiole. It closely resembles *alata* but the rachis is not much winged.—West Indies and Mainland to Peru.

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9. *Dancea nigrescens*, JENM.—*Rootstock* large, very stout, erect or decumbent, stipites caespitose, stiffly erect, ligneous, dull dark wood brown or blackish, puberulous or naked, devoid of nodes 1 $\frac{1}{2}$ -2 $\frac{1}{2}$  ft. l., solid somewhat angular when dry: fronds 2-4 $\frac{1}{2}$  ft. l. 1 $\frac{1}{2}$ -2 $\frac{1}{4}$  ft. w., pinnate with several erecto spreading lateral pinnae 2 in. apart  $\frac{3}{4}$ -1 $\frac{1}{4}$  ft l., 2 in. w., cuneate at the base and shortly stipitate, the apex cuspidate and sharply serrate slightly narrower in the lower half but not distinctly, tapering, finely scaly along the costae and minutely so under the surface chartaceous, the same colour on both sides the margins even or crenulate-repand when dry, terminal pinna absent. *Veins* very close, once forked from the base or near it curved as they approach the margins, fertile fronds, central taller pinnae  $\frac{3}{4}$  to nearly 1 in. w., petiolate from a  $\frac{1}{4}$ - $\frac{1}{2}$  in. terminal, present, conform, petioled to 1 $\frac{1}{2}$  in., stipe and rachis hollow and flattened when dry, much stouter than in the barren and  $\frac{3}{4}$  in. thick, both turn finally black *synangia* as in all the other species.

British Guiana; in swampy forest of the upper Demerara River near the banks. A very large species 5-6 $\frac{1}{2}$  ft. high standing stiffly erect. It has the same pinnate habit as most of the other large species but differs strikingly by the hard ligneous character of the stems, which without fertile fronds suggests doubt as to its being *Dancea* at all. It is the largest species of all.—Gardener's Chronicle, Nov., 1898.

In the late Mr. Jenman's manuscript I find two sheets unplaced and now add them (without prejudice to Jenman's arrangement) at the end of genus. The manuscript was, I know, intended to be finally revised and they were probably left for that purpose.—(Ed.)

(See *Addenda Nos. 10 and 11.*)

## ADDENDA.

From "Jamaica Bulletin," 1903.

"10. *Danea jamaicensis*. UNDERWOOD BULL. TORREY CLUB, 29, 675 1902.—A low, coarse plant with acuminate sterile pinnæ and narrow pointed pinnæ on the sporophylls. Rootstock unknown. Stipites pale, 18–24 cm. long with 2–4 nodes; sterile leaves with a terminal and 11–12 pairs of pinnæ about 2 cm. apart except the lowest pair which is smaller 10–14 cm. l., 1–7–1–9 cm. wide, tapering rather abruptly into a slender deeply serrate acuminate point. Veins mostly forked, the intercostal spaces about 12–14 (measured above the furcations) sporophylls with about 8–12 pairs of pinnæ, about 2 cm. apart, short stalked, 5–7 cm. l., 5–7 m. m. wide, obtuse, at base and tapering at apex. Rachis somewhat alate above.—Description Underwood, Jam. Bull.

This appears to be the species confused by Jenman with *D. stenophylla* with which it has little in common, while both the Kew specimens enumerated above are placed under *D. Moritziana*.

*D. Moritziana* is from Columbia and has the pinnæ of the sterile leaf quite different in shape tapering towards the cuneate base and much more gradually towards the apex, intercostal spaces 16–17 to 1 cm.

11. *Danea Jenmani*.—UNDERWOOD, BULL. TORREY CLUB—29–677 1902. Rootstock (as far as known) horizontal, rather stout, stripes brown scurfy, those of sterile leaf 10–11 cm. long, usually with one node. Pinnæ 7–9 pairs opposite 2–3 cm. apart, obtuse at base with a short pedicel 4–5–6 cm. long by 1–8 cm. wide, abruptly short, pointed, the margin more or less serrulate at the apex. Rachis scurfy more or less alate. Veins mostly forked, the intercostal spaces about 12–1 cm. above the furcations; basal and terminal pairs of pinnæ shorter than the others, sporophylls with about 11 pairs of pinnæ shorter than the others; 5 m. m. wide, mostly blunt and short stalked. Description. UNDERWOOD—Jam. Bull.

This is a species called *D. alata* by Jenman and although he calls it "frequent" in Jamaica it appears to be very rare in collections. We have found it to be frequent near Mabess River.—Jamaica Bulletin, 1903."

## ORDER III.—OPHIOGLOSSACEÆ.

*Sporangia* globose, plain and destitute of a ring or crown, opening transversely to the base, (bivalved) or by a lateral vertical slit, biserial or clustered free or comate in flattened spikes which are simple pinnate or paniculate. Rootstock epigeous, vernation straight.



*Fronds* herbaceous small or medium sized, the respective fertile and barren divisions, entire, pinnate or decomposed. *Venation* reticulated or free.

This order differs from the two preceding by the veneration or evolutions of the fronds being straight instead of coiled and crosier-like. It consists of three small genera one of which is usually regarded as monotypic: the other two having six to twelve species each. The former ranges from India to Australia while of the latter two, the distribution is general through the temperate and tropical regions of both hemispheres. The rootstock is in all cases permanent, but even in the tropics in some instances the fronds which are naked membranous or fleshy are annual, and die after a month's duration.

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Sporangia united in simple linear spikes.

Fronds simple forked or palmate.

Veins reticulated.

1. *Ophioglossum*.

Sporangia free in compound panicles; fronds composed; Veins free.

2 *Botrychium*.

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#### GENUS I.—OPHIOGLOSSUM, L.

*Sporangia* united laterally splitting transversely at maturity, biserial on flattened linear spikes which are  $\frac{1}{2}$ –2 in. l., petiolate, solitary or several shortly or long-petiolate springing from the common stem at the base, of the leaf blade. *Fronds* simple forked or palmate, membranous. *Veins* reticulated. *Rootstock* small fleshy and sometimes sub-tuberous.

This is a small genus of some twelve species many of which vary and are perplexing to define the limits of. The majority are terrestrial, and grow in open places, such as meadows or highland moors. Some prefer wet situations and the sides of rivers where they are regularly inundated. Two or three tropical species are epiphytal and grow on trees. They are distributed throughout the temperate and tropical regions of the world, and are about equally divided between both hemispheres

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Plants terrestrial; fronds entire; spikes single, erect.

1. *O. nudicaule*.

2. *O. vulgatum*.

3. *O. reticulatum*.

Plants epiphytal; fronds palmate, spikes several, pendent.

4. *O. palmatum*.

1. *O. nudicaule*, L. FIL.—*Rootstock* small, descending sheathed with brown scales. *Stipites* slender, erect,  $\frac{1}{2}$ –2 in. l., leaf-blade erect, oblong or ovate-oblong, 1–3 in. l.,  $\frac{1}{4}$ –1 in. w., shortly and equally pointed at apex and base thinly membranous. *Veins* copiously areolated, the larger series containing a smaller, a distinct vein

forming a slender mid rib. Spike single, slender  $\frac{1}{2}$ – $1\frac{1}{2}$  in. l., on a slender erect petiole 1–3 in. l., continuous with the stipe.—Eat. Fer. N. Ann. Pl. 81. *O. surinamense*, Reich.

Variable in size, a much more slender plant than the two following with uniformly ovate-oblong leaf-blades which are the same form at each end and slightly pointed. It is generally dispersed from the Southern United States to Brazil.

(A.) *var. macrohizon* Kunze appears in Trinidad.—(Ed.)

2. *O. vulgatum*, LINN.—*Rootstock* as thick as cord, creeping under ground, producing buds at intervals which throw out roots and leaves. Stipe 1–2 or 3 in. l., erect. *Leaf-blades*  $\frac{1}{3}$ –1 in. each way, sub-cordate but variable in shape, acute pointed, the sides rounded at the base, and suddenly contracted and shortly extended into the petiole but not distinctly cordate, firmly membranous. *Veins* copiously reticulated with mere slender divaricating venules or finer meshes within the larger areolæ, no mid-rib. *Spike*—single, springing erect from the top of the stipe at the base of the leaf-blade  $\frac{1}{3}$ – $\frac{3}{4}$  in. l. on a stem 1–2 or 3 in. l., Hooker, Brit. Ferns, t. 46 Eat. Fer., N. Am. Pl. 81.

Jamaica; abundant, forming continuous patches, often several feet wide, on open slopes and ridges at 5,000 feet altitude and higher, mature in December and January. This is found in the same habitats as *Botrychium ternatum* under bracken (*Pteris*) on open land. The fronds are one or two from each bud stock; distinguished from *reticulatum* to which it approaches nearer in the form of the leaf-blade than to *nudicaule*, by the large patches which it forms the smaller size, firmer texture and leaf-blades not cordate at the base; the creeping horizontal cord-like rootstock form a close network two or three inches deep under the ground, and when the plants are pulled up by hand, only the small thickened bud-stock is obtained; the former must be dug up with some sharp instrument. At the lower elevation plants are found intermediate between this and *reticulatum*. Spread around the world, in the temperate zone and occurring at high elevation in the tropics.

3. *O. reticulatum*, LINN.—*Rootstock* small, incased in brown sheath-like scales. *Stipe* erect, 2–4 or 6 in., l., broadened gradually at the top. *Leaf-blade* sessile or with a short petiole-like base, sub-ovate and acute at the top or orbicular reniform fully cordate at the base, often deeply, with rounded auricles or sub-cordate cuneate; thin and membranous when dry. *Veins* visible, copiously areolated, the large meshes containing fine ones, no mid rib. *Spike* single, 1–2 in. l., on a petiole 3–6 in. l. which is erect and continuous with the stipe. Pl. Fil. t. 164. Hook. and Grev. Icon. t. 20.

Jamaica; frequent from the lower hills up to 3,000 or 4,000 ft. altitude, occupying grass banks, meadows and similar places. The leaf-blade varies from suborbicular, the outer part rounded and the base deeply cordate with rounded lobes to sub-ovate; the outer part acutely pointed, the base less distinctly cordate, and tapering in the centre haft-like. The latter form approaches *vulgatum*, but is much larger.—Tropical and Sub-Tropical regions of Asia, Africa and America.

4. *O. palmatum*, LINN.—*Rootstock* short, fleshy, the crown clothed with pale dense tomentum. *Stipites*  $1\frac{1}{2}$ –2 li. thick  $\frac{1}{2}$ –1 ft. l. *Leaf blades* pendent  $\frac{1}{2}$ –1 ft. each way, V or W shaped, palmate, the base cuneate, the sides curved and entire, deeply cut from the front towards the base into 2–4 or 5 lobes, which are 4–8 in. l., 1– $2\frac{1}{2}$  in. w., tapering outwards to the point, texture flaccid fleshy, but membranous

when dry. *Veins* forming copious oblong hexagonal areolæ which are directed from the base outwards. *Spikes* 3-6 or perhaps more pendent at short intervals along the top of the stipites or rarely on the sides of the base of the leaves, 1-1½ or 2 in. l. on petioles ¼-½ in. l.—Hooker Pl. Fil. t. 163. Eat. Fer. N. Am. pl. 81.—*Cheiroglossa* Presl.

Jamaica and Guiana; infrequent on trees in moist forests or overhanging rivers from the lowest to nearly the highest elevations (6,000 ft.) A peculiar and beautiful plant. The plants from the high mountain forest are coarser than those from the lower habitats. It grows in peat formed of the root fibres of other plants and often in a mass of several individuals together, sometimes in company with *Vittaria stipitatum*. The fronds are three or more to each plant.

## GENUS II.—BOTRYCHIUM, Swartz.

*Capsules* free and apart, globose splitting when ripe to the base, bi-serial on short flattened spikes, fertile and barren divisions of the fronds alike pinnate or more or less decomposed. *Veins* free. *Stipites* springing from a membranous sheath which crowns the fleshy rootstock. There are about eight or a dozen species in this genus, which vary in character as do those of the preceding and follow likewise, generally the same geographical distribution. In one form or other, all but two or three, are found on the American Continent, though only the two following penetrate the tropical limits and are there confined to temperate elevated regions. Both are deciduous, the fronds dying away annually.

Fertile division springing from near the base of the petiole.

1. *B. ternatum*.

Fertile division springing from the top of the petiole.

2. *B. virginianum*.

3. *B. Jenmanii*. Underwood. } See Addenda.  
4. *B. dichronum* Underwood. }

1. *B. ternatum*, SWARTZ.—*Leaf-blade* erect, 1-4 in. l., ternate in a small state regularly pinnate in a large subdeltoid-bi-quadrupinnatifid 2-6 in. l., nearly twice as broad, naked, firmly herbaceous. *Pinnæ* and pinnulæ petioled. equal on both sides, the former shaped like the whole leaf, ultimate segments 1½-5 li. br., rounded on the outer margin and finely toothed. *Rachis costæ*, &c., flat, membrane margined in the outer part. *Veins* forked very oblique, pinnate spreading. *Panicle* shaped and divided much like the leaf 1-5 in. l. and br. greatly overtopping the leaf on a petiole 6-8 in. l.—Pl. Fil. t. 159. Eat. Fer. N. Am. Pl. 20.

Jamaica; common on open moors and slopes, often or perhaps chiefly under branches (*Pteris aquilina*) at 5,000-6,000 ft. altitude. Gathered plentifully on ridge above St. Helen's Gap, Govt. Cinchona Plantation. Each plant is formed of a single frond generally with, but often without a fertile division. Rarely there are two such divisions to one barren leaf, mature in December and January. Normally this is a much smaller species than the next, but it is sometimes found with fronds produced without the fertile division that are a span long and much more broad. They completely contrast however in their features. The broadly rounded segments of the leaf and fertile division springing from the base of the petiole are sufficient characters to mention to distinguish this.—Jamaica; from Canada to New Grenada, Pacific Islands, Asia and Europe.

2. *B. virginianum*, SWARTZ.—*Stipe* erect,  $\frac{1}{2}$  in–1 ft. l., *Leaf-blade* membranous naked, sub-deltoid, 5–9 in. l., more broad, tri-quadrifid the parts regularly pinnatifid. *Pinnæ* spreading or erecto spreading, lowest pair largest, petioled acuminate. *Pinnule* similar in shape, more or less decurrent at the base, pinnatifid to the winged costulae, tertiary segments 3–5 li. l.  $1\frac{1}{2}$ – $2\frac{1}{2}$ -li. b. acute lobed, or toothed largest final segments a li. or less w. and d. *Rachis* winged in the upper part, and costæ nearly or quite to the base. *Veins* simple or forked pinnate in the more entire segments. *Panicle* similarly shaped and divided 3–5 in. each way on a petiole 4–6 in. l. not much overtopping the leaf—Pl. Fil. t, 159. Hooker, Gard. Ferns t. 29. Eat. Fer. N. Am. Pl. 33.

Jamaica; common in forests 4,000–6,000 ft. altitude, mature in March and April. The usually larger size acuminate and more finely cut divisions, and thin texture, distinguish this at sight from the preceding. There are two fronds to each plant, one without and the other with the fertile division. As *ternatum* is confined to open situations so this is confined to deep forest shade. In both, the fronds perish after fruiting. Jamaica, Europe, Western Asia.

#### ADDENDA.

##### From "Jamaica Bulletin."

1. *Botrychium Jenmani*, UNDERW. Fern. Bull. 8–59, 1900.—Root fleshy, from a short axis 1–2 cm. l. *sterile lamina* separating at a height of 1–2 cm. and usually at or below the surface of the ground, the leaf staff 2–5 4 cm. long, flesh coloured or pinkish: lamina 3–12 cm. w. 2–5 9 cm. high, composed of a central bi-pinnatifid portion and two similar but smaller lateral ones which take their origin alternately at distances varying from 5–15 m.m. lower lateral division the larger with 4–6 lateral pinnules each composed of 3–5 oval segments with finely crenate margins. Venation indistinct except in younger laminae. Sporophylls 12–22 cm. l., including the rather compact mostly tripinnate panicle.

This species is comparatively common above *Cinchona* growing among bushes and along trails. Description, Underwood in Jam. Bull.

2. *Botrychium dichrosum*, UNDERW. Bull. Torrey Club, 30, 45, 1903.—A moderately tall plant, allied to *B. virginianum*, with sessile sterile lamina and persistent leaf of the preceding year. Roots fleshy, stem 15–20 cm. l., smooth, sterile lamina broadly triangular 20 cm. w. 15 cm. l., tri-pinnatifid with about five pairs of nearly opposite gradually diminishing pinnæ, the lowermost with longer pinnules on the outer side and inclined forward at an angle, pinnules 8–10 on each side of winged rachis, the lower ones slightly narrowed at the base, and 3–5 toothed at the apex, all gradually simpler towards the apex of the lamina, pinnate triangular spreading 3 cm. or more long on a slender stalk 4 cm. 2–3 cm. pinnate. This plant is quite frequent in the region above *Cinchona* and Morce's Gap extending upon John Crow Peak and Blue Mountain. A fine series of specimens is in the Herbarium of the Department of Public Gardens, Jamaica. Since seeing the plant in the field we find it attains a larger size than the original description indicates.—Description Underwood in Jamaica Bull.

## ORDER IV.—EQUISETACEÆ.

Rootstock creeping; stems erect cylindrical, longitudinally furrowed, pointed at intervals, hollow except at the joints which terminate in a completely circular monophyllous dentate margined sheath; branches simple, springing through the lower part of the sheaths, whorled or irregular, and spreading. No distinct leaves, fructification terminal on simple persistent or fugacious stems, in cone-shaped heads, which are composed of several horizontal tiers of peltate stipitate scales that bear on their underside 6-9 pale membranous sporangia that open longitudinally in a slit on the inner side, spores minute, green, united to elastic wool-like threads (elaters) that are spontaneously irritant while dry.

A single genus represents this order, numbering about twenty or thirty species, the principal part of which are spread through the north temperate zone, where they are in several European countries, common, and well-known Marsh plants, which in Britain go by the name of horse tails and paddock pipes. In some species the barren and fertile stems are alike; in others they are different. They form no leaves proper, but these organs are represented by the membranous sheaths of the joints. The branches are produced after the stems have developed, and they grow through the base of the sheaths.

## GENUS I.—EQUISETUM.—(See characters of Order.)

1. *E. bogotense*, H. B. K.—Baker Fern Alb. p. 3, *E. flagelliferum*, Kunze, *E. chilense*, Presl. *E. quitense*, Fée.—Rootstock free, creeping, throwing up at intervals tufts of slender, virgate stiffish shoots which are 6-12 or 15 in. l., hardly a li. thick; ribs 4-6 or 7. Teeth of the sheaths acuminate, dark coloured, scariose edged, as many as the ribs of the stems. Spikes terminal  $\frac{1}{2}$ - $\frac{3}{4}$  or 1 in. l.

Guiana; gathered by Appun, but his label bears no number or locality. It is a very slender species with small twig-like branches, which are usually simple from the base, but occasionally are branched verticellately from one or more of the joints. The slender rootstocks extends freely in the ground and the tufts of shoots are thrown up at intervals of an inch or so. The fertile shoots are the same in character as the barren. Apparently on the authority of a specimen in the Kew Herbarium, this species has been ascribed to Jamaica in both Milde's monograph and Martin's Flora of Brazil. The specimen was collected by Hartwig and bears his number 1462, which on reference to his original label is, discovered to refer a plant gathered by him in the Andes near Quito. The St. Vincent locality for *E. palustris* Linn. a north temperate and Arctic species mentioned by Grisebach, p. 648, is probably also a mistake due to a misplaced specimen.—Mexico to Chili.

2. *E. giganteum*, LINN.—Stems 4-6 or more ft. high,  $\frac{1}{2}$  in. thick, stiff and erect. Furrows very numerous (two dozen or more). Sheaths whitish  $\frac{1}{2}$  in. deep, teeth as numerous as the furrows of the stem. Acuminate, blackish with white scariose edge. Ribs, keel-like. Branches numerous virgate, spreading, furrows few (seven). Sheaths corresponding in number of teeth, spikes apiculate terminal

on the twigs, 2-8 li. l., oblong or ovate. Fertile shorter than the barren branches.—Sloane Herbm., Brit. Mus., Baker, Fern Al. p. 4.

Infrequent in marshy places and by the sides of rivers, from the lowlands up to 3000-4000 ft. altitude, gathered on the banks of the upper part of the Yallahs River above Pleasant Hill, first collected by Sloane and again by Purdie, Wilson and March at the ferry Morant Bay. The species is widely spread and variable in size and other characters which has led to its having received several names. It is said to grow in some instances as much as 20 feet high.—Jamaica, Haiti, Martinique.

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## ORDER V.—LYCOPODIACEÆ.

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Stems erect or pendent with terete or flattened branches, which are more or less repeatedly dichotomous except in (*Phylloglossum*) and leafy throughout. Leaves relatively small, often minute simple or forked, one nerved, many seried and irregularly whorled or rarely, distichous; usually linear or subulate, close and imbricating or more apart, rarely distant, sporangia bi-or-tri valved, single sessile and axillary in the leaves of the normal or modified branches or in special spikes. Spores of one kind, abundant and dust like. Four genera comprise this order, but only two of them are represented in this flora. The others—*Phylloglossum* and *Tmesipteris* are confined entirely to Australia and the adjacent islands.

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|----------------------|----------------------|
| 1. <i>Lycopodium</i> | sporangia 2, valved. |
| 2. <i>Psilotum</i>   | sporangia 3, valved. |
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## GENUS I.—LYCOPODIUM, Linn.

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Sporangia reniform, one-celled bivalved, axillary in the normal or modified leaves of the outer parts of the branches, or in the imbricating scales of special spikes leaves of one or two kinds, multifarious, rarely distichous or bi-serial, generally close and often imbricating; stems and branches mostly terete, dichotomously or pinnately branched, leafy throughout.

These are the true club-mosses, and their aspect, except in a few instances, is very different from that of their allies the Selaginellas from which they are technically distinguished by having only one kind of spores and spore-capsules. They number about a hundred species, which are spread over the torrid and warmer regions of the globe, but most concentrated in the equatorial belt. Some of the species range widely in both the old and new worlds. They are divided in their habits of growth into two divisions, terrestrial and epiphytal, though in regard to some few species the line is not strictly drawn. The former grow in moist ground generally, either open to the direct sunlight or in forest shade. Two or three species however appear to prefer well-drained ground. Both are erect or prostrate in growth and more or less gregarious. Of the epiphytal, some are strictly pendent, others have a tendency to be pendent with the gradual lengthening of their weak, flexible branches, while still maintaining vertical growth. These generally grow in forests on the branches of trees. The spores of *L. clavatum* and others are highly inflammable, and are sometimes

employed in fireworks under the name of vegetable brimstone. Some few species are known to be purgative and others emetic.

Fructification in dense terminal catkin-like spikes.

Spikes on slender peduncles. Leaves dimorphous, branches flat with a distinct upper and under side.

1. *L. carolinianum*.

2. *L. scariosum*.

3. *L. complanatum*.

Leaves all conform; branches cylindrical.

4. *L. clavatum*.

Spikes sessile on normal branches.

5. *L. alopecuroides*.

6. *L. cernuum*.

Fructification on much modified thread-like, terminal branches.

7. *L. aqualupianum*.

8. *L. subulatum*.

9. *L. robustum*.

Fructification in the unmodified outer parts of the branches.

Leaves subulate.

10. *L. verticellatum*.

11. *L. funiform*.

12. *L. reflexum*.

13. *L. intermedium*.

14. *L. rigidum*.

15. *L. dichotomum*.

Leaves broader.

16. *L. sarmentosum*.

17. *L. linifolium*.

18. *L. mollicomum*.

19. *L. taxifolium*.

NOTE BY ED.—Mr. Jenman contributed a short paper to *Timehri*, published in British Guiana on the "Lycopodiaceæ of Guiana and their allies."—Reprinted by *Argosy* office, Demerara, 1887.

1. *L. carolinianum*; Linn.—Baker Fern al., p. 28. Fl. Brazil, p. 115. *L. repens*, Sw. *L. affine*, Bory.—Stems prostrate, rooting at intervals, extending and shortly branched. Leaves 5 serial of two kinds; lateral larger and spreading horizontally in a single series on each side, the intermediate in a line with the rachis, to which they are appressed, 3 serial, linear-lanceolate and much smaller, the former 2-2½ li. l., ½-¾ li. b., linear-oblong, decurrent on the rachis at the base, curved on the upper margin. Spikes, simple 1-2½ in. l., on slender distant simple erect stems 3-15 in. l., which spring from the prostrate stems and are very laxly clothed with small subulate leaves 1-1½ li. l. Scales of spikes ovate, tapering to a spinulose point, the margins often faintly denticulate.

Trinidad and Guiana common; terrestrial in wet swampy ground on the surface of which the stems extend, the slender-terete fertile ones being thrown up stiffly erect at angles. The minute leaves of the fertile stems are arranged in a sub-verticillate manner, and spread a little from the stem. There are no leaves on the underside of the prostrate stems. A very distinct species,

that grows in swamps in humus, in which the stems are often found embedded by the fresh deposits, Madagascar, Hong Kong, Ceylon, Bourbon, Mauritius, Florida, Reunion, South Africa, New Guinea, Angola and Tropical America, from the United States to Brazil, but only Guadeloupe and Trinidad, so far as known of the West India Islands.

2. *L. scariosum*, Forst. var. *L. Jussieui*, Desv.—Coriaceous, stiff light green and rather glossy above paler and duller beneath. Stems terete 2-3 or more ft. l., a line thick, stiff, prostrate often forked from the base clothed laxly with minute lacerate-edged leaves, distantly alternately pinnate, branches pinnate, branchlets forked, 1-2 or more times and divaricating, flat  $\frac{1}{4}$  in. w.,  $1\frac{1}{2}$ -4 in. l., leaves of two kinds, the larger superior 2-serial spreading laterally  $1\frac{1}{2}$  li. l.,  $\frac{3}{4}$  li. br., flat close spreading, oblong dimidiate, the base adnate decurrent, upper edge nearly straight, the lower up-curved to an acute point, smaller inferior minute, linear-lanceolate, appressed to the under side, 2-3 serial, lax, pale and scarious. Stipes linear-oblong, cylindric,  $1\frac{1}{2}$  in. l., more or less, in single pairs terminal or forked, peduncles which are 3 in. or more l. from the base, bracts peltate sub-deltoid or diamond shaped, acuminate scarious-edged sporangia cordate.—Hook. Icon. t. 126. Bak. Fern al. p. 29.

Jamaica; infrequent in moist places at 5,000 ft. altitude growing with sphagnum moss gathered at Morces gap, the locality where Purdie and Bancroft previously gathered it—and on the Government Cinchona plantation above Newhaven gap—(Hart).—The American variety differs from the type by the long forked peduncles. The branches are flat and spread flatly over the surface with diffused growth. The lateral leaves are attached longitudinally, not transversely as in the other species, and the branchlets resemble fronds of *Polypodium trichomanoides*. The smaller leaves are exceedingly minute and confined to the underside.

3. *L. complanatum*, L.—Stiff coriaceous and rigid light green, stems prostrate 1-2 ft. l. or more, a li. thick, terete, clothed laxly or more closely with small subulate leaves. Branches erect or spreading, alternate fastigiate flattened repeatedly dichotomous; the final branchlets very numerous and crowded linear  $\frac{3}{4}$ -1 li. w., 1-2 $\frac{1}{2}$  in. l. from the fork, converse above, subconcave beneath, of two forms, the larger lateral keeled, concave, entire, sharply cartilaginous-pointed, traversely adnate and decurrent  $\frac{1}{2}$  li. l., sub-deltoid; the smaller, uniserial on both the upper and under sides, adnate and decurrent, narrow entire cartilaginous-pointed, those of the former series larger, and lanceolate acuminate, filling the space between the lateral ones; posterior much smaller subulate, with vacant space around, peduncles 2-4 in. l., 1-3 from each branch, repeatedly dichotomous; spikes varying from two to upwards of a dozen together  $\frac{3}{4}$ -1 $\frac{3}{4}$  in. l., cylindric, bracts peltate sub-deltoid cuspidate, the base rather cordate but also pointed, sporangia reniform—Baker, Fer. Al. p. 28.

Jamaica; abundant on open banks and waysides, often spreading over extensive spaces and covering the ground as densely as grass, at 4,000-6,000 ft. altitude. It may be readily recognised by the copious crowded narrowly linear branchlets and numerous spikes. The latter are either in pairs or solitary on the final peduncles. All parts are very rigid. The lateral leaves of the branchlets are folded with a sharp angle and attached transversely, and adherent half their length. The intermediary ones also adherent in like manner but narrow. Though in this and the two preceding, the branchlets appear flattened, and the upper and undersides distinct and different, the leaves are really all round them as in the truly cylindrical species.—America, from Canada to Rio Janeiro, and Peru, New Guinea, Japan, Madagascar, and Europe, lately discovered in England.



4. *L. clavatum*, Linn., Baker, Fern Al. p. 26. Fl. Brazil, p. 114. Gr. Fl., B.W.I., p. 646. Plumier t. 165, B.—Stems repent, rooting here and there and branching laterally 2–3 ft. l. cylindrical. Leaves lax, showing the stem freely between. Branches erect free again branched, or repeatedly so, but not in a dichotomous manner. Densely clothed with leaves which are in several series rather stiff, subulate,  $\frac{1}{4}$  l. w.,  $1\frac{1}{2}$  li. l., with a hair point incurved. Fertile branches 1–3 in. l., slender terete, erect, with minute verticillate leaves at intervals. Spikes in pairs or alternate 2–6 in all to a branch. Bracts ovate-acuminate, attenuated, undulate-margined somewhat spreading.—Pl. Fil. t. 165. B. Baker, Fern Al., p. 26.

A very stiff species both in stems and leaves, but variable in its degree of branching: in some cases lax, in others very dense, and having the branchlets short. The stems of the spikes are several inches high and decrescent in size upwards, and thinly clothed with minute subulate leaves. The spikes have shorter pedicels from  $\frac{1}{2}$ –2 in. l. The leaves quite conceal the stems of the ordinary branches though not of the primary and final ones.

In forest and half open places at 3,000–5,000 ft. altitude, it covers acres in uninterrupted extent. In many places *L. aristatum*, H.B.K., is the common American form.—West Indies and tropical and temperate regions of the world. Common in Jamaica.

5. *L. alopecuroides*, L. BAKER, Fern, Al. p. 19, Fl. Brazil, p. 114. Stems prostrate, repent, rooting here and there branching at intervals and spreading laterally, densely clothed with linear acuminate plain or ciliate edged leaves which form several series, all of one kind, overlapping and more or less spreading, 2–3 li. l.,  $\frac{1}{8}$ – $\frac{1}{4}$  li. w. Fertile branches simple erect cylindrical 6–10 in. l., clothed like the barren stems but less densely, the leaves rather small. Fertile spikes single at the top, the leaves of which are the same in character (not changed into bracts) only longer. Sporangia copious, concealed under the leaves.

Guiana; Mt. Roraima in Thurn. no. 146. This is a peculiar species, intermediate between the pinnate and dichotomously branched kinds. It has habit of growth of the former, but resembles the latter by having its leaves unchanged only that they are longer. It varies a good deal in the length of the leaves and consequently in diameter or apparent diameter of the branches. The unmodified leaves of the fertile portions give this a claim to be placed in the last division. Terrestrial on wet ground, like *L. carolinianum*.—United States, Brazil and Buenos Ayres, but not yet found in the West Indies.

6. *L. cernuum*, BAKER, Fern Al., p. 23.—Stems cylindrical, strong, repent, thinly clothed with small linear acuminate leaves, and throwing up at intervals erect pyramidal or plumose fertile branches, which are 1– $1\frac{1}{2}$  ft. h., with numerous tiers of spreading branches alternate in direction to each other, thus forming the plumose habit, these branches again freely branched with spreading branchlets which are fertile at their tips. Leaves in several series, dense, not flat, spreading upcurved  $\frac{1}{3}$  li. w., 1 li. l. Seta like, main rachis clothed sparsely like the primary stem. Spikes from a line to an inch l., 1– $1\frac{1}{2}$  li. diameter. Bracts ovate acuminate, the margin fringed.—Pl. t. 163. Bak. Fern Al., p. 23.

Readily recognised by its pyramidal or plumose habit, resembling young fir trees, each branchlet terminated by a pale coloured recurved catkin. These vary in length in the plants from different countries. In the local states they are from 1–6 li. l., so far as I have seen, but may be in some cases more, as

species from Venezuela and Brazil have them in some cases from  $\frac{3}{4}$ -1 in. l. It grows both in shaded and exposed places and on both wet and dry ground.

In Guiana it reaches 8 ft. high supported by the bushes among which it grows.—Common in Jamaica and other West Indian Islands.

7. *L. aqualupianum*, Spring and Mon. Lycop. 1. p. *L. guadalupianum*, Fée, Fil. Ant. t. 33. f. 1. Baker Fern Al. p. —Pendent, repeatedly dichotomous 1-1 $\frac{1}{2}$  ft. l., including the fertile part. Stems slender, 4 gonial-reddish. Leaves flat spreading ovate 4 serial  $\frac{1}{4}$  inch long. 1 $\frac{1}{2}$  li. w., blunt-acute, the base narrowed in the same way, even edged. Texture firm, colour dark green. Fertile portions 4-6 in. l., terminal 2-3 dichotomous about 1 li. diameter, angular. Bracts folded keeled 3 serial, a li. or less l., very acuminate.

Trinidad and Guiana, Mount Roraima and Potaro River, above the Kaieteur Fall on branches of trees. Readily recognised by the flat oblong ovate spreading leaves, equal at both ends and firm though hardly stiff slender tassel-like fertile part. The bracts are keeled and folded more sharply than in the next species.—Cuba, Porto Rico, Guadeloupe, New Grenada.

8. *L. subulatum*, Desv. Encyc. Suppl. III, 544, Baker Fern Al. p. 21. Pendent, slender, pliant, repeatedly dichotomous, 2-3 ft. l. including the fertile portion. Branches stramineous, 3 gonial, hardly thicker than thread. Leaves 3 serial, often in whorls, spreading about  $\frac{1}{4}$  in. apart, and always shewing the slender stem between, linear, lanceolate pointed; the base rounded,  $\frac{1}{4}$ - $\frac{1}{3}$  in. l., 1-1 $\frac{1}{4}$  li. w. Texture rather flaccid, colour pale or straw-green. Fertile branches as long as the barren part, repeatedly forked. Bracts sharply acuminate keeled sporangia copious.

Guiana; in Thurn, n. 230, base of the cliff Roraima.—This species resembles in general aspect that preceding it and closely in habit, but it is more slender and much more pliant and flaccid, the leaves more apart, narrower and acute or, acuminate and pale in colour, and it seems to grow very much longer—no doubt from the branches of trees.—Tropical America, widely spread.

9. *L. robustum*, Klotzsch., Baker Fern Al., p. 23.—Stems stout, erect or sub-erect; branches straw-green, pendent two or three times dichotomously forked, 1 $\frac{1}{2}$  ft. l. Leaves spreading  $\frac{1}{2}$  in. or more l., lanceolate, acute or acuminate, the edges revolute when dry, mid-rib evident, green, firm in substance. Fertile portions 3-4 in. l., two or three times forked, leaves ovate-acute  $\frac{1}{3}$  in. l.

Guiana; collected by Richard Schomburgh (n. 1209) and not re-discovered since. A stronger plant than the two preceding.—Endemic.

10. *L. verticellatum*, Linn, Baker Fern, Al., p. 14. *L. acerosum* Sw.—Stem erect, forked nearly from the base. Branches erecto-spreading, many times dichotomous, leafy throughout, 1-1 $\frac{1}{2}$  li. in diameter including the foliage, not decrescent outwards or hardly so, stiff, final branchlets 1-1 $\frac{1}{2}$  in. l. from the fork, widely divaricating. Leaves flat, stiff, straight, rather spreading 1-2 li. l., subulate whorled and close, in several series. Fertile leaves rather widened at the base over the capsules, which are orbicular-cordate.—Baker Fern, Al., p. 14.

Jamaica; infrequent, terrestrial in shady places, gathered at "Old England," near the Government Cinchona plantation, at 4,000 feet altitude, though the slenderest, this is the stiffest plant of this division. The leaves are larger than in *cernuum*, flat, stiff and straight, about  $\frac{1}{6}$  of a line w. or less. The multi

forked branches rise to about 6 or 9 inches above the ground and extend laterally as much, forming low compact spreading little plants. Of all the species it is one of the most freely branched, and the leaves are so inconspicuous that the plants appear to consist of little more than flexuose, much forked and diverging slender branches.

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11. *L. funiforme*, Bory. Baker, Fern Al., p. 14. Spring, Mon. Lycop. 1, p. 50.—Branches long, simple or dichotomous, pendent or prostrate, 2-8 ft. l. Leaves crowded, several-serial not spreading, straight and stiff, contracted laterally or convolute,  $\frac{1}{4}$ - $\frac{1}{3}$  in. l.,  $1\frac{1}{4}$ - $\frac{1}{2}$  li. w., freely overlapping, sharp even-margined. Sporangia reniform,  $\frac{1}{2}$  li. w., the lips closed, visible between the narrow leaves.

Guiana; this species is peculiar for its long tail-like branches which frequently fork, and reach from 1-8 or 9 ft. l. unmodified. When on trees it is strictly pendent, but it grows also on the ground, in leaf mould and in other rubbish, and then the stems become constricted here and there and root at the place. The leaves remain fixed in a line with the rachis, not at all spreading, and their convolute condition gives them a very narrow stiff and sharp appearance. It is found both at low and high altitudes.—Cuba, Porto Rico, Guatemala and Nicaragua.

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12. *L. reflexum*, LAM.—Branches erect, from  $\frac{1}{2}$ - $1\frac{1}{2}$  ft. high, repeatedly dichotomous, close and parallel, strong and rather stoutish ribbed. Leaves plain-edged or faintly serrated, reflexed  $\frac{1}{4}$  in. l.,  $\frac{1}{3}$ - $\frac{1}{2}$  li. w., broadest at the rather rounded base linear subulate crowded, in several series, sporangia abundant, exposed reniform  $\frac{1}{3}$ - $\frac{1}{2}$  li. w., much expanded.—Pl. t. 166. *L. reversum*, Presl. Baker, Fern Al., p. 11.

A terrestrial species growing on open banks and other grassy places. The stems are erect, but as they are bifurcate and lengthen, they curve and rest on the ground. It is a stiff species but the stems are not rigid being fleshy. While green they are 1-2 li. thick without the leaves.—Jamaica, Dominica, St. Vincent and Guiana, Southward to Brazil.

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13. *L. intermedium*, SPRING.—Branches slender, ribbed, distantly dichotomous few or several times, reaching 2 ft. l., the divisions relatively few, parallel or spreading more or less, not decrescent. Leaves recurved throughout, 7 or 8 farious linear-subulate, 2-4 li. l.,  $\frac{1}{4}$  l. w., very laxly arranged on the ribs; margins even or slightly serrated, sporangia about 1 li. w., reniform.

A more slender stemmed species than *L. reflexum* of which Mr. Baker regards it a variety with longer inter-branches, and smaller more recurved and laxer leaves. The branches are the same size and the leaves the same length from the primary stem to the ends of the branches. The top of the recurved leaves turned quite round to the base and thus they form nearly a circle.—Guiana.

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14. *L. rigidum*, GMEL., Baker Fern, Al., p. 12—*L. squarrosum* Lam.—Erect, branches dichotomously forked, reaching a foot or more long, the final ones finger thick, the leaves included, firm in substance, dark-green. Leaves in several series, crowded, spreading, the edges even, linear acuminate  $\frac{1}{4}$ - $\frac{1}{3}$  in. l., the face channelled, the back slightly 2 ribbed. Sporangia all along the outer branches, the leaves not modified.

St. Vincent; a terrestrial mountain species very near *reflexum* but stronger in growth and denser in foliage. Both agree in habit.—Martinique and Guadeloupe.

15. *L. dichotomum*, Jacq., Hort., Vind., III. 26. t. 45. Baker, Fern Al., p. 16. *L. mandiocanum*, Raddi. Fil. Bras. 77. t. 4.—Branches strong, leafy from the base once to several times dichotomously parallel or divaricating, firm and erect or spreading, ribbed, leaves 8 farious, close, rather crowded, linear subulate straight or curved, spreading variously horizontally, deflexed or upcurved often falcate  $\frac{1}{3}$ - $\frac{1}{2}$  li. w.,  $\frac{3}{4}$ -2 in. l., even-edged, purple at the base not decrescent upwards, the outer ones often seeming longer but really not so. Abundantly fertile, the sporangia cordate, much exposed.

Terrestrial near Blue Mountain Peak, Jamaica, epiphytal at low altitudes. The leaves are very close and spread in various directions, the outer part of the branches often appearing to have longer ones than the inner parts, but it is only in appearance and due to the angle at which they spread. The species is a characteristic one, variable in its extent of branching with a more or less upright (not pendent) but ultimately, as in *L. reflexum*, spreading growth. The leaves also vary in width, some plants from this cause having a much finer aspect than others.

16. *L. sarmentosum*, SPRING., MON. ii. 13, Baker Fern, Al., p. 15.—Branches very slender pendent, repeatedly dichotomously forked, reaching from 1-2 ft. l., straw green, or turning in time bright red. Leaves  $\frac{1}{3}$ - $\frac{1}{2}$  in. l., laxly arranged, half spreading, membranous, light-green, the edges even, the mid-rib evident. Sporangia along the outer branches, the leaves not modified.

Guiana; at high altitudes. This approaches some of the smaller states of *linifolium*, but is of somewhat firmer in substance though having a like pendulous habit of growth.—New Granada and Ecuador.

17. *L. linifolium*, LINN., Baker Fern, Al., p. 16. *L. flexibile*, Fée.—Branches ribbed, very slender, leafy from the base of the primary stem, flaccid, repeatedly dichotomous, pendent reaching 2 feet long or over, final branches few or many often very numerous. Leaves lax 3 serial, spreading, linear or linear-subulate often rather falcate  $\frac{1}{4}$ - $\frac{3}{4}$  or 1 li. w.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. l., herbaceous in texture, with a distinct mid-rib, even-edged. Abundantly fertile, often from the inner bi-furcations. Sporangia fully exposed, reniform. - Pl. t. 166, C. Bak. Fern, Al., p. 16.

This differs from the two preceding species by its slender, thread-like (in size) branches having the leaves only 3-farious, the flaccid texture, and loosely arranged leaves between which the stem is visible from  $\frac{1}{3}$  to  $\frac{1}{4}$  in. It is so pliant that a plant might be rolled into a ball between one's hands without injury. The var. of *L. taxifolium*, *passerinoides*, in some of its states comes near it, but in that the stems are never so slender or flaccid, nor the leaves so few in series or so loosely placed on the ribs. Some specimens have nearly 100 final branches, all developed by repeated forking from a single primary stem. It extends from the lower hills to the high mountains.—Jamaica, Guiana.

18. *L. mollicomum*, Mart., *L. graminum*, Spring and Mon. Lycop. ii., p. 19. Baker, Fern Al., p. 14.—Branches firm, erect, or sub-erect, or at length pendent, repeatedly, dichotomous, reaching at length 6-12 in., the spaces between the forkings  $1\frac{1}{2}$  or 3 in. l. Leaves crowded, many farious, erecto-spreading, usually straight, linear-subulate,  $\frac{1}{4}$ - $\frac{1}{2}$  in. l., often slightly falcate laterally, even-edged. Branches parallel or spreading. Sporangia copious on the outer branches, reniform  $\frac{1}{4}$ - $\frac{1}{2}$  li. w.

Trinidad, Guiana; collected by Drake in the latter country, and by Dr. Finlay in the former. This is something like a small state of *passerinoides* of

erect habit and short branches, with fine very copious acicular foliage, approaching that of *dichotomum*.

It is several times forked, but the whole plant generally reaches only 6 to 10 so that the space between the bifurcations is relatively very short. It is a terrestrial species.—Guatemala and Ecuador to Brazil.

19. *L. taxifolium*, LINN.—Stems ribbed, leafy from the base pendent, spreading more or less erect, repeatedly dichotomous from 6 in. to 2 ft., primary divisions spreading or close and parallel as in the final branches, all decrescent or not outward. Leaves close but not crowded, straight linear acuminate even-edged, erecto-spreading several serial, flat, firm, but not stiff,  $1-1\frac{1}{4}$  li. w.,  $\frac{1}{2}-\frac{3}{4}$  in. l., very little narrowed at the transversely attached base, final branches fertile. Sporangia reniform copious.—(Bak. Fern, Alb., p. 16.)

Var. *L. passerinoides* H. B. K.—Branches longer, usually between the forking, more supple, always pendent, from 1-6 ft. l., decrescent outwards; leaves of inner stems as large, outer  $\frac{1}{3}-\frac{2}{3}$  in. l.,  $\frac{1}{2}-\frac{3}{4}$  li. w., all linear-lanceolate, branches fertile often a considerable length.

Nearest *L. linifolium*, but with much stiffer and thicker stems and firmer, stiffer leaves. The habit of the type varies a good deal. Young plants are quite erect and grow either on the ground or on trees, though generally on the latter, older plants have laxly spreading branches while others again are quite pendent. The primary stems are  $\frac{1}{2}$  in. thick and have 5-7 ribs, and consequently the leaves as they are attached to the ribs number the same series. The var. is marked by its more uniformly pendent habit often much greater length, (I have gathered it myself 6 ft. l. and at 6,000 ft. altitude) and branches decrescent outwards, while some of its forms touch *L. taxifolium* on the one hand others seem to pass quite into *L. linifolium* on the other. It extends from 1,000-7,000 feet altitude.—Tropical America and West Indies.

## GENUS II.—PSILOTUM, Swartz.

*Sporangia* sub-globose, trilobed opening vertically down the centre of the lobes into three equal valves, axillary in the minute distant leaves. Spores very minute oblong, exceedingly copious, branches very slender, repeatedly dichotomous, trigonal or flattened. Leaves simple or bifid.—*Bernhardia*, Willd.

This small genus consists of only two species, which however make up for the paucity of type in their abundance and wide distribution. They are small and twiggy plants starting from a simple base, and repeatedly forking till they become a broom-like fascicle of twigs with distant and very inconspicuous leaves. Branches triquetrous.

1. *P. triquetrum*.—Branches triquetrous.
2. *P. complanatum*.—Branches flat.

1. *P. triquetrum* Swartz, Baker Fern, Al., p. 30.—*Lycopodium nudum*, LINN.—Rootstock composed of few wiry deeply penetrating roots; stem few inches to a foot long, strong, wiry, erect or pendent, cylindric below, ribbed and angular above approaching the first furcation; branches triquetrous with sharp angles repeatedly dichotomous, decrescent outwards, forming a brush-like head, slender, virgate, short, stiff or longer and very flexible, leaves minute, simple

or forked at intervals indentations on the edges of the branches; capsules in the axils of the leaves 3-lobed.—Baker Fern, Al., p. 30. *Lycopodium nudum*, Linn.

A more repeatedly branched bushy and stiffer species than the next, easily recognised by the three-cornered branches. The final branches are usually very numerous, about  $\frac{1}{2}$ – $\frac{1}{3}$  li. w., 1-2 or 3 in. l., sharply tri-gonal, fluted between the angles. The plants grow in fissures of rocks and between the roots of trees, the roots penetrating deeply. In some cases the branches are short and stiff with the capsules reaching to the ends, in others long and pliant extending much beyond the capsules. The capsules are like the fruit of many Euphorbiaceous plants in miniature. Hevea for instance. It varies a good deal and many species have been made by Karl, Muller and other authors of it.

It is most common at middle altitudes, in West Indies, but occurs quite frequently both above and below.—West Indies generally.

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2. *P. complanatum*, Swartz.—Stems, few to several in. l., cylindrical at the base, becoming gradually triquetrous below the primary furcation, stiff or pliant; branches flattened flaccid repeatedly dichotomous, 1- $1\frac{1}{2}$  li. w., with a distinct mid-rib; leaves minute,  $\frac{1}{4}$ – $\frac{1}{3}$  li. l., hardly more simple or forked, pointed, forming mere dentations along both margins at intervals of  $\frac{1}{4}$ – $\frac{3}{4}$  in. apart, capsules 2-3 valved axillary dihescent — Bak. Fern Al., p. 30.

Included on the authority of Swartz who founded the species, but I have seen no local specimen. Grisebach included it in his Fl. B.W.I. Islands, but had seen no specimen. However as it is undoubtedly found in Cuba (Wright n. 947), the locality is not unlikely. Differs from the preceding by its flat 2-edged broader branches with a rib down the centre. It varies from 6 in. to 2 ft. l. in different parts of the world.—Cuba.

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## ORDER VI.—SELAGINELLACEÆ.

Sporangia of two kinds, large and small; the former (*macrosporangia*) containing *macrospores*; the latter (*microsporangia*) containing *microspores* borne separately in the axils of normal or modified leaves, in which they are single, and free or partially embedded, the macrosporangia being calcareous white and inferior in situation to the microsporangia.

This order consists of two very dissimilar genera if only the physiognomy or conformation of the respective members be regarded. They are associated however by the character which they possess in common, of the sporangia and spores being of two kinds, one larger than the other, generally considerably larger; each kind of the spores possessing separate sexual potentiality, generation resulting from the interaction of the contents of the cells that are produced on their germination; if this union is not effected the antecedent germs perish.

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Fructification in terminal spikes in the axils of imbricating keeled bracts; leaves usually dimorphous.

### 1. Selaginella.

Fructification embraced in clasping base of the normal leaves; the plants rosette-like in form.

### 2. Isoetes.

## GENUS I.—SELAGINELLA, Beauv.

*Sporangia* bivalved, uniform, orbicular, or subglobose, borne in modified 4 gonal spikes, at the end of the branches. *Macrosporangia* inferior, usually few, containing few large white macrospores, *microsporangia* superior, usually numerous, containing multitudinous minute microspores. Leaves small or minute generally of two kinds, rarely of one major and minor, each kind bi-serial imbricating or slightly apart, the larger series lateral and spreading from the axis obliquely or horizontally, the smaller intermediary, more or less in a line with and dorsal on the axis, and appressed thereto. Fronds generally pinnately or irregularly divided, rarely simple, often decomposed, more or less copiously, leafy throughout. Prostrate, sub-erect, or scandent.

Selaginellas differ from their allies the club-mosses, or Lycopodia by possessing two kinds of sporangia and spores, the generally distichous, arrangement of the leaves which gives the stems a flattened appearance, their more or less prostrate or subscandant habit of growth, their uniformly communal association and as a rule, terrestrial location. Three or four Lycopodia have a somewhat similar arrangement of their leaves, and a considerable number are terrestrial, and some too are communal, but among the Selaginellas these are nearly constant characteristics.

In a few species, none of which is native, and within the limits of this flora, the leaves are all of one kind and multifarious, the stems being consequently convolute as is the rule in the Lycopodia. In nearly all the species there is some variation of shape in the fronds, and in many this is considerable.

Bracts of the fruit spikes of two kinds, the smaller series following the major normal leaves, and the larger the minor leaves.

1. *S. Crugerii*.
2. *S. platyphylla*.
3. *S. anomala*.

Bracts of the fruit spikes all of one kind.

Fronds prostrate or sub-erect not flagelliform at the apex.

Rachises not exceeding 1-1½ li. w. across the leaves.

4. *S. minima*.
5. *S. cayennensis*.
6. *S. brachyclada*.
7. *S. valdipilosa*.
8. *S. caribense*.
9. *S. porelloides*.
10. *S. denudata*.
11. *S. confusa*.
12. *S. rotundifolia*.
13. *S. dendricola*.
14. *S. rhodostachya*.

Rachises not exceeding 1½-2 li. w. across the leaves.

15. *S. Jenmani*.
16. *S. albo-nitens*.
17. *S. radiata*.
18. *S. roraimense*.
19. *S. portoricensis*.
20. *S. serpens*.
21. *S. didymostachya*.
22. *S. substipitata*.
23. *S. potaroensis*.

Rachises exceeding 2 li. w. across the leaves

24. *S. producta*.
25. *S. marginata*.
26. *S. caudorhiza*.
27. *S. guyannensis*.
28. *S. macroclada*.
29. *S. minioides*.
30. *S. Breynii*.
31. *S. affinis*.
32. *S. epirrhizos*.

Fronds prostrate or sub-erect, flagelliform at the apex.

33. *S. patula*.
34. *S. setigera*.
35. *S. flagellata*.
36. *S. stolonifera*.

Fronds erect.

37. *S. vernicosa*.
38. *S. erythropus*.
39. *S. cuspidata*.
40. *S. flabellata*.
41. *S. Parkerii*.
42. *S. Hænkiana*.
43. *S. puberula*.

1. *S. Crugerii*, JENM. (n. sp. 1897).—*Fronds* sub-prostrate overlapping in growth, rooted at the base, and leafy thereto, dark green, membranous, 1-1½ in. l. with alternate branches ¼-½ in. l. *Rachises* stramineous, slender hardly flexuose, angled when dry; about 1 li. w. over the leaves, the primary and secondary being of nearly equal width; major leaves spreading horizontally apart, or the outer ones contiguous imbricating at the ends of the branches, oblong-lanceolate, ½ li. l., ¼ br., acute inequilateral, the upper base rounded and cordate, but not conspicuously expanded, copiously ciliate round the auricle which overlaps the rachis, minor leaves apart on the primary rachis, but close on the outer ones, slightly inequilateral and sub-cordate narrowly lanceolate, spinulose pointed ¼ li. l., spikes flattened, 1½ li. l., and nearly or quite as wide, bracts resupinate, lax, erecto-spreading, slightly ciliate-edged.

Trinidad, No. 194. Herb. Trin., near *S. ottonis* of Cuba. In form of frond and leaf it resembles *albo-nitens* from which however it is readily distinguished by the short flat spikes, long bracts, and freely ciliated bases. The bracts which follow on the plane of the minor leaves are much enlarged, but those which follow the major leaves are not much reduced.—Endemic.

2. *S. platyphylla*. BAKER, Fern, Al., p. 121.—*Fronds* prostrate, rooting along the rachis, leafy from the base 4-6 in. l., linear-oblong, 2 pinnately branched, the branches short, sub-distant alternate, longer primary ones ½-1½ in. l., secondary ones ¼-½ in. l. *Rachises* weakly, the primary 3 li. w. over the leaves, secondary 2-2½ li. w. Major leaves spreading horizontally from once to twice their own width apart on the main rachis, becoming contiguous at the top, obliquely ovate-oblong 1½-2 li. l., ¾ li. b., obtuse, acute, inequilateral, the upper base auricled, broadly rounded and ciliate, quite overlapping the rachis, the margin whitish scarioso. Minor leaves



alternate, edged like the major, ovate cuspidate, rather obliquely cordate at the base but nearly equilateral, quite in line with the rachis. Spikes very short, lax. Bracts dimorphous, the larger lanceolate, the smaller ovate, hardly keeled, open, revealing the sporangia. Var. *laxa*. Major leaves more ovate, wider apart throughout, the auricled base quite plain. Texture thinner and rachises slenderer and weaker.

Guiana; Jenman n. 1,482, ravines near the Kaieteur Fall, Upper Demerara River n. 4,164 and Mt. Raywa, no. 2,131, nearest to *S. producta* but much less and more laxly branched, with more distant leaves and quite different fruit spikes, which are only 1-2 li. l. The habit is flaccid, and it spreads quite flat on the ground or other surface that it may be growing on. The variety is a lax form (my n. 1,819) also from the Kaieteur Fall region; a region abounding in ravines and great fissures between rocks in which Selaginellas are plentiful. In this and the two preceding the bracts are of two kinds, larger and smaller in which the order observed in the leaves is reversed, the smaller ones following on the larger leaves, and the larger on the smaller leaves.—Endemic.

3. *S. anomala*, Spring., Mon. Lycop. II p. 247 Baker Fern Al. Lycopodium, Hook. and Grev.—*Fronde*s prostrate or sub-prostrate, forming overlapping patches in growth leafy from the base, rooting or not along the rachis, varying from oblong to broadly ovate-deltoid or flabellate in outline, 2-3 or 4 in. each way, 2-3 times pinnately branched, the final branches in the larger and broader fronds often crowded. Major leaves spreading nearly horizontally, the inferior ones contiguous, the outer imbricating 1-1½ li. l., ½-¾ li. w., acute, broadened at the base, which is unequally cordate, broadly auricled and overlapping the rachis on the upper side, the margin plain or faintly spinulose. Minor leaves ascending, imbricating ovate-lanceolate acuminate cuspidate finely spinulose edged. Spikes 2-8 li. l., bracts in two series, those of the upper side twice as long as the under ones, the latter especially spinulose-edged.

Guiana; Jenman, n. 2322. Gathered in wet places in the forest opposite Bartica, Essequibo River, Cayenne. Leprieur, n. 165. Sagot, n. 749, 1123. Well distinguished from *S. platyphylla* by its more compound and broad-spreading fronds, and smaller closer leaves. The leaves are so crowded and imbricated on the outer branches (which also are crowded in the larger fronds) that on the herbarium sheets they have quite a spinulose aspect on the upturned underside.—Endemic.

4. *S. minima*, Spring, Mon. Lycop., p. 86. Baker, Fern, Al., p. 84.—*Fronde*s small, about 1 in. l., simple linear spreading, ovate-oblong, sub-acute, deeper on the upper side, the margins bare, ½ li. l., rather less w., lax or sub-distant in the lower part, but in the outer close or slightly imbricating. Minor leaves nearly equilateral, but obliquely attached, ovate, acuminate or rather cuspidate the margins faintly echinate overlapping each other at the top of the fronds. Spikes 1-1½ li. l., as wide as the frond or wider, bracts rather loose and spreading, hardly keeled, resembling the minor leaves of the fronds.

Guiana; gathered by Leprieur in Cayenne. This is the dwarfiest of the known Guiana species and in other respects, as well, a very distinct little plant. On the lower part of the stem the leaves are separate, while in the outer part or in the short branches they are close or crowded. The spikes are generally wider than the fronds the bracts spreading rather openly, only half folded, in shape like the intermediary leaves. The ciliation of the auricle of the lateral leaves is rather long, and gives the underside a pubescent appearance.—Endemic.

5. *S. cayennensis*, BAKER, Fern, Al., p. 44.—Fronds overlapping, 2 in. l., delicate and slender, freely pinnate; major leaves moderately firm in substance, bright green, contiguous on the outer branches, oblique oblong, obtuse,  $\frac{3}{4}$  l. l., inequilateral, the upper side broader and more rounded at the base. Minor leaves  $\frac{1}{3}$  li. l., freely imbricated ovate acute. Spikes not known.

Guiana; gathered at the Cataract of Brodel in Cayenne by Leprieur n. 157. This I have not seen and have taken the description from Mr. Baker's.

6. *S. brachyclada*.—BAKER, Fern Al., p. 45. *diminutifolia*, Jenman. Gard. Chron., Vol. 2, 1887.—Fronds 1-2 or 3 in. l., half as wide or less, rooting chiefly at the base, but also frequently from the joints, two or three times pinnate, the branches short, alternate, contiguous or sub-distant,  $\frac{3}{4}$ -1 li. w. over all the outer ones hardly narrower than those of the main axis, firm in texture, dark green. Major leaves spreading obliquely, contiguous, the outer ones imbricating obliquely ovate obtuse,  $\frac{1}{2}$  li. l., less broad, plain-edged, the base obliquely cordate, much deeper on the superior rounded base, the auricle of which laps over the rachis. Minor leaves ovate, acute, equilateral, sub-cordate, imbricating on the outer branches but not at the base of the stems, or hardly so,  $\frac{1}{4}$  li. l., nearly as wide, slightly convex. Spikes not seen.

Guiana; Jenman, n. 1481. Gathered on rocks at the foot of the Kaieteur Fall—a situation that if closely examined would probably yield several other species, new or old. Of this group of diminutive species this is most compact in its leafage and most freely branched.—Endemic.

NOTE.—On my visit unfortunately, I had temporarily lost my sight from an attack of ophthalmia, which compelled my leaving the situation almost quite unexplored.—G. S. J.

7. *S. valdepilosa*, BAKER, Fern, Al., p. 40.—Fronds delicate, pale green, quite prostrate, very slender; linear and repent, simple or with few short branches 1 li. w. over the leaves, terminating in a depauperated tail having only small leaves, in shape like the minor series. Major leaves spreading, not quite horizontally, ovate, acute, subequilateral, the margin freely ciliated, most so on the upper side,  $\frac{1}{2}$  l. l., less w., with half their own width between them. Minor leaves also ovate, equilateral or nearly so, acute, but not spinulose pointed, hardly  $\frac{1}{4}$  li. l., and less wide, both margins pubescent. Spikes a line or over 1; bracts keeled.

Guiana; Jenman, n. 1484. Gathered in the deep ravines in the forest near the top of the Kaieteur Fall. Marked by its little sparsely branched, very narrow linear fronds 1-1 $\frac{1}{2}$  in. l., terminating in a depauperated tail, which character gives it a claim to be placed in the patula group. The colour is exceedingly pale. The under side looks very pubescent, from the long marginal hairs of the rather auricled upper base of the lateral leaves which overspread it. The pale colour is probably due to the little light that can penetrate to the deep chasms between the rocks in which it grows. Measured across the leaves the diameter is the same throughout, from the base of the plant outwards, and the rachises are all of the same size and strength.—Endemic.

8. *S. caribense*, Jenman.—Fronds prostrate, very delicate, 1-2 in. l., usually leafy to the base, the shorter ones quite simple, the longer with short alternate mostly distant branches, which are 1-6 li. l.,  $\frac{3}{4}$ -1 li. w. over the leaves. Major leaves contiguous, apart, or the

lower ones subdistant, about  $\frac{1}{2}$  li. l., or less, and rather less w., point rounded or sub-acute, base sub-cordate, the upper auricled side ciliate and deeper than the rather contracted lower. Minor leaves minute, apart, aristato-acuminate sub-dentate, the outer side longer than the inner, the margins slightly ciliate. Spikes about a line l., the bracts not distinctly keeled, ciliate margined or spreading and revealing the sporangia.—Baker, Fern Al., p. 68.

Rare in forests at 5,000–7,000 feet altitude on trees and decaying logs. Between the Jamaica species *confusa* and *rotundifolia*, much weaker and more delicate than the former and not so lax and delicate as the latter. The leaves only imbricate at the tips of the short branches, elsewhere they are more or less apart increasingly so downwards. Both main rachis and branches are the same width over the leaves. The fertile bracts are rather broader but otherwise conform with the intermediary leaves. The sporangia are very few to a spike only 2-3 or 4 in my specimens.—Endemic. (See new sp. in Addenda.)

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9. *S. porelloides*, SPRING.—Fronds rooted at the base, variable in out-line, sub-deltoid or irregular, bright or dark green, membranous, freely but openly branched, twice pinnate, the branches about 1 l. w. over the leaves. Rachises very slender and angular; Major leaves apart, oblique, ovate-oblong  $\frac{1}{2}$  li. l., less w., barely pointed inequilateral, the rounded and broader superior base imbricating on the rachis, the margins faintly spinulose-ciliate. Minor leaves apart, ovate-cuspidate, the margins ciliate, the outer side extending beyond the rachis. Spikes copious 2–5 li. l., outer bracts sharply keeled, cuspidate inferior, open.—Fée, Fil. Ant., t. 34, fig. 3. Baker, Fern, Al., p. 85.

Jamaica forests at 6,000 feet altitude. In its leaves this resembles *confusa* but it is quite differently branched and is of a broader and different shape.

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10. *S. denudata*, SPRING.—Fronds 6 in. l., irregularly branched, the branches flaccid and laxly sparingly again branched. Major leaves apart on the rachises but crowded on the outer part of the final branches, ovate sub-obtuse, 1 li. l., horizontal, sub-equilateral, equally cordate, firm in texture, Minor leaves but little smaller, ovate-acute. Spikes short, 4-stichous, square, bracts ovate-lanceolate, strongly keeled.—Baker, Fern Al., p. 55, Lycopodium, Willd.

Jamaica; collected by Swartz. This I have not seen and the description is made up from Mr. Baker's in his synopsis of the genus which also is made from Springs monograph ii. 84. Grisebach supposes it to be a form of *confusa* devoid of marginal bristles to the leaves, but in every spine almost these bristles are a varying character and their absence without other characters would not constitute a specific difference.—Endemic.

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11. *S. confusa*, SPRING.—Fronds 3–4 or 5 in. l.,  $\frac{3}{4}$ – $1\frac{1}{2}$  in. w., pale green, composed of the central axis and few or several distant alternate simple or again branched branches which are  $\frac{1}{4}$ –1 in. l., and 1 l. w. over the leaves below which is a slender decrescent stem 1–3 in. l., very laxly clothed downwards with decrescent minute leaves. Major leaves lax, spreading with usually half or fully their own widths between them, flat ovate, rather pointed, sub-cordate and ciliate on the rounded wider upper base  $\frac{3}{4}$  li. l., rather less w., Minor leaves ovate, aristate, pointed,  $\frac{1}{2}$  li. l., the margins ciliate, reaching

from one to the other alternately but not imbricating. Spikes 1-3 or 4 li. l., 4 stichous. Bracts keeled, loose, ciliate margined. Sporangia small.

Jamaica; frequent in forests 5,000-7,000 feet altitude on trees and rocks. A slender weakly species, of the same width in all its parts, rather lax in leafage and variable but still well marked in form, generally a slender thread-like stem, bearing root fibres at the base of the small scattered leaves which increase in size upwards toward the branches. In branching it is variable. In some of the weaker states, though regularly pinnate the branches run together at the top, while in others they spread laterally as regularly as in *serpens*. Perhaps these are distinct varieties as the leaves in the former are much smaller and the general habit weaker. The spikes are often flattened in dried specimens though strictly 4 stichous in life.

A. is much shorter, very much denser in habit and a dark green. It is my n. 30 of 1876 in part in Herb. Kew.—Endemic.

12. *S. rotundifolia*, Spring. Mon. Lycop. p. 85. Fée, Fil. Ant. t. 34, fig. ii. Baker, Fern Al., p. 68.—Fronde very delicate and slender, intermatted in growth 2-4 in. l., simple or with short simple distant branches, the apex often attenuated about  $\frac{3}{4}$  li. w. over the leaves. Major leaves, light green membranous apart, spreading laterally orbicular and cuspidate nearly equilateral, cordate and ciliate on the superior side at the base; or faintly on both margins. Minor leaves,  $\frac{1}{4}$ - $\frac{1}{3}$  li. l., acute not touching. Spikes very short,  $\frac{1}{2}$  li. w., lax, bracts acute keeled.

Dominica, St. Vincent, Grenada. A more slender and delicate species than *confusa* with which Grisebach united it. It is well marked by the orbicular, but cuspidate, major leaves.—Guadeloupe, Martinique.

13. *S. dendricola*, JENMAN, Gard. Chron. Vol. II. 1887. Bak. Fern Album, p. 70.—Fronde prostrate, few or several inches long, consisting of a slender thread-like rachis, and short distant usually simple or casually forked branches  $\frac{1}{4}$ - $\frac{3}{4}$  in l. Leaves extending to the base of the primary rachis, major ones  $\frac{1}{4}$ - $\frac{1}{2}$  li. each way, hardly pointed, the base sub-equal, slightly cordate, nearly orbicular horizontal, all except the outer ones more or less apart or distant, the latter contiguous or imbricated, and becoming gradually oblong in shape. Minor leaves very minute, ascending, distant, ovate, acute. Spikes often crowded at the end of the frond,  $\frac{1}{4}$ - $1\frac{1}{4}$  in. l., 4-gonal; bracts sharply keeled, acuminate and finely denticulate.

Guiana; Jenman, n. 2323. Gathered on decaying logs in the forest opposite Bartica, Essequibo River, growing among, and often more or less concealed in moss. It is a slender delicate species, apparently nearest *S. rotundifolia*, Spring, and *S. minima*, Spring, of West Indies or Guiana species. It has a curious duplex habit, the long main rachis having lax or distant leaves, which are nearly round while the short branches and apex of the frond which are fertile at the ends, have close or crowded oblong leaves. At the top of the frond the spikes are peculiarly long, a dozen often extending forward side by side; those of the distant lateral branches are shorter. The colour is a very pale green.—Endemic.

14. *S. rhodostachya*, BAKER, Trans. Lin. Soc. Ser. ii.—Fronde prostrate with fine descending roots along the main and other rachises, leafy to the base, slender, the lower part not branched, 6-9 in. l.,  $1\frac{1}{2}$ -2 in. w., 3 pinnate, the branches distant and irregular in length. Major leaves spreading with two or three times their own space between them, ovate, rounded at the end, equilateral, the margins

faintly ciliate or naked,  $\frac{3}{4}$  li. l.,  $\frac{1}{2}$  li. w., delicate but firm in texture, very pale green; Minor series similar in shape, but acute, hardly at all or little or much reduced, close, distant or sub-distant, the margins also slightly ciliate or naked. Spikes very short,  $1-1\frac{1}{2}$  li. l., the bracts conform with the leaves, lax, those of the upper side not much enlarged, slightly ciliate on the edges. All the rachises quite terete and stiffish.

Guiana; in Thurn, n. 226, base of cliff, Roraima. This by the variation in its leafage in the same fronds, is a peculiar species. In some of the specimens the lateral and intermediary leaves are exactly alike in form and size, in others the lateral are slightly larger, and in others again very decidedly so. The only modification seen in the bracts is that in some instances they are slightly keeled, and the superior series are not much larger than the inferior, but the difference is decided and obvious. Though very slender, the species has a firm rather wiry look.—Endemic.

15. *S. Jenmani*.—BAKER, Fern Al., p. 45. *Kaieteur*, JENM., Gard. Chron., Vol. 2, 1887.—Fronds quite prostrate, rooting freely along the axis, herbaceous dark green, 3-4 or 6 in. l., with pinnatifid, sub-distant, short branches, which are usually again shortly branched in like manner. Rachis firm stramineous, leafy to the base  $1\frac{1}{2}-2$  li. w. over all. Major leaves oblique, contiguous, most apart at the base of the stem, imbricating on the outer branches  $1-1\frac{1}{2}$  li. l.; 1 li. w.; very inequilateral, obliquely ovate-deltoid, obliquely cordate at the base, the auricled superior side very disproportionately deep, point obtuse; margins plain. Minor leaves ovate, the bases slightly overlapped, cordate and nearly equilateral, acute,  $\frac{3}{4}$  li. l., and nearly as w. Spikes short, bracts convex or keeled acute.

Guiana; Jenman, n. 1480. Gathered on the rocks at the foot of the *Kaieteur* Fall. This has some resemblance to *S. platyphylla*, but the branches are nearer, the leaves close, broader in rotation to the length, the upper side being so disproportionately wide as to produce an obliquely deltoid outline, though those at the ends of the branches which are crowded and imbricating, are more equally cordate, and in all cases the one at the base of each branch is strictly heart-shaped, both sides being equal, as is the case in some other species. My specimens are only slightly in fruit, and it is probable the spikes are longer than I have described.—Endemic.

16. *S. albo-nitens*, SPRING.—Stems short and thread-like if any, clear of the leafy base of the fronds. Fronds delicate, pale or dark-green, spreading from 1 in. each way, to 2 or 3 in. at times, twice or thrice pinnate, the lateral branches extending generally nearly or quite as much as the central, making the outline more or less flabellate,  $1-1\frac{1}{2}$  or rarely 2 li. w. over the leaves; leaves with a short space between them half or fully their own width, the major ones spreading oblong, obtuse, or rounded at the end,  $\frac{3}{4}-1$  li. l., barely  $\frac{1}{2}$  li. b. Minor very small, ovate-lanceolate with a long spinescent somewhat cuspidate point. Spikes 3-5 li. l., hardly  $\frac{1}{2}$  li. w., 4-stichous bracts ultimately loose. Sporangia very minute.—Baker Fern, Al., p. 72.

Jamaica; infrequent on open banks at 3,000-6,000 feet altitude. A very small species generally not much over an inch high, consisting of a few irregular branches nearly 2 li. w. with spoke-like relatively long fertile spikes. Its distinguishing features are the spreading habit of growth, oblong lateral leaves, that are not at all pointed—long pointed intermediary ones, which under a strong lens are faintly denticulate and long fertile spikes. The latter, as in *confusa*, are compressed in dry specimens.—Cuba, Brazil.—(See new species in Addenda.)

17. *S. radiata*, BAKER, Fern Allies, p. 86. *S. increscentifolia*, SPRING, Mon. Lycop. II, 106. *Lycopodium radiatum*, AUBLET.—Fronds rooted to the base, with scattered leaves and no branches in the lower part; above this lanceolate, ovate, or radiate, 2 or 3 times branched; branches 1-2 in. l., contiguous, erecto-spreading 1-2 l. w. over all. Major leaves erecto-spreading or more patent, contiguous, or with once or twice their own space between them on the branches, and often more on the main rachis, sub-ovate, acute, widest at the unequal base, the upper side rather auricled and lapping on the rachis, the rounded part freely ciliate (or both sides of the more equal sided leaves found at the axils) 1-1½ li. l., ½ li. w. Minor leaves ovate, rather cuspidate, the point weak and hair-like, inequilateral but not conspicuously so, attached by the inner base, apart, showing the rachis freely between them. ½ li. l., bracts, ciliate-margined, keeled, but little open.

Trinidad (Sherring). A relatively small, much branched species, weakly and flaccid in substance, varying in the degree of ciliation, some plants being quite naked. It is 4-8 in. l.; the stem often devoid of branches half the length, above which it spreads in a variable, lanceolate deltoid or broader form. The lower branches are usually longest and spread, pinnately, alternately ¼-½ in. apart. The growth is prostrate rooting at the axils of the branches. The colour of the upper side is vivid green but the under is a rather silvery hue.—Surinam, Guiana.

18. *S. roraimensis*, BAKER, in Trans. Lin. Sec. Bot. Ser. ii t. 56, C. Fern, Al., p. 86.—Fronds sub-erect or more decumbent, rooting only at and near the base, bi-tri-pinnate, leafy to the base, 3-5 in. l., 1-2½ in. br. Branches spreading laterally or converging forward, 2½ in. l., w. over the leaves, the Major series of which are close or with as much as their own width between, nearly horizontal, acute, the base, unequally sub-cordate, the upperside auricled, overlapping the rachis and faintly spinulose, 1-1½ li. l., ½ li. w. Minor leaves ½ li. l., equilateral cordate, the point acuminate but not cuspidate, the margins faintly spinulose. Spikes square, ¼-1¼ in. l., often copious. Bracts keeled.

Guiana; Roraima, in Thurn, n. 122—Gathered near the foot of the slope; most abundant on the banks, which it covers, of the upper part of Macouria River; Jenman n. 2324. A very near ally of *S. radiata* for which without close comparison it might be mistaken, but a stiffer and more erect species. The range in altitude of the two localities above mentioned is the widest known of any of the local species.—Endemic.

19. *S. portoricensis*, A. Br., Baker Fern Al., p. 86.—Fronds prostrate, a few inches to a span or more l., 1-3 in. br., pale green, moderately firm in texture, pinnately or otherwise branched, with filiform stramineous descending roots from the point 3 li. w. across, the leaves on the primary rachis 1½ li. over the secondary ones. Major leaves contiguous, imbricating on the final branches, sub-horizontal, broader on the upper side, the base auricled rounded and ciliate edged ¾-1 li. l., ½-¾ li. w. Minor leaves ascending in a line with the rachis, slightly imbricating, sharply acuminate ½ li. l., ¼ li. w. inequilateral and the base sub-cordate. Spikes 2-4 li. l., 4 gonol bracts firmly imbricating, keeled and very acuminate.

Guiana, Trinidad (Cedros woods), Porto Rico; a pale straw-green, quite prostrate species, firm of texture, near *roraimensis* and *radiata* but stronger than either.—Porto Rico.—Jen. No. 1818.

20. *S. serpens*, SPRING.—Fronds prostrate throughout  $\frac{1}{2}$ -1 ft. l., 1-4 in. w., pinnately branched from the base upwards triquadripinnate, the leaves unmodified both at the base and apex varying in colour at different times elastical membranous in texture. Primary branches 1-1 $\frac{1}{2}$  li. w. over the leaves, variable in length and generally irregular or unequal in the same frond, 1-4 in. l.; secondary  $\frac{1}{4}$ - $\frac{1}{2}$  in. l., tertiary (if present) only rudimentary, but fertile. Leaves slightly imbricating generally but often not, or barely on the primary rachis; major, sub-ovate spreading, nearly equilateral cordate with rounded auricles at the base; the point blunt or rounded,  $\frac{3}{4}$ -1 li. l., and as wide, the inferior basal margin ciliate. Minor leaves attached laterally near the base ovate pointed but not spinulose, outer margin spinulose-ciliate all round,  $\frac{1}{2}$  li. l. Spikes 1-6 li. l.,  $\frac{1}{2}$  l. w., 4 stichous, square but loose. Bracts sharply keeled.—Baker, Fern Al., p. 46.

Jamaica; very abundant on open banks and rocks, spreading in large patches which completely conceal the surface, the fronds quite flat with hair-like roots, from the joints of the rachises on the underside, chiefly at low altitudes and among the lower hills, the colour changes during the day, and varies from a very pale green to purplish brown in different parts. The texture is rather elastic and contrasts somewhat when dry. The branches are 1 $\frac{1}{2}$ -2 li. w. The lateral attachment of the intermediary leaves which makes them ear-shaped, the sharp rib of the rachis showing between the two rows are reliable and certain characters for determining the species.

21. *S. didymostachya*, SPRING.—Fronds stiff, wiry, light or dark-green,  $\frac{1}{2}$ -1 ft. or more l., repeatedly and much branched from the base upwards, prostrate with long filiform stramineous roots descending from the joints beneath the branches 1-2 li. w. over the leaves. Rachises throughout flexuose, glossy, stramineous, stiff and wiry but not rigid, the leaves conform but rather more lax than those of the branches. Major leaves ovate-oblong, inequilateral rounded but with an indistinct point at the apex, the joint at the base raised 1 li. l.,  $\frac{3}{4}$  li. w., not imbricating or only slightly so in the final branchlets, the margins usually naked. Minor leaves ascending in the line of the rachis, cuspidate, sub-keeled in the outer branches, faintly spinulose. ciliate  $\frac{1}{2}$  li. l. or less, little imbricating or not. Spikes 2-4 l. l.,  $\frac{1}{2}$  l. br., square bracts, appressed or loose keeled.

*A. var. integerrima* Fée, Fil. Ant., t. 34, fig. 4.—Fronds smaller and more compact with narrower parts, *b. var. densa*, Jenm. Habit very dense, final branches very numerous lying close together.

Jamaica; abundant in mountain forests, principally in the middle region from 2,000-4,000 feet altitude, covering the ground to which it is lightly attached by the long stilt-like stramineous glossy descending roots. It is a well marked species characterised by the wiry roots, its usually lax freely branched habit, strong, stiff and constantly zig-zag rachises which are quite round and raised joints of the leaves.

22. *S. substipitata*, SPRING, Mon. Lycop., p. 198. Gr. Fl. B.W.I., p. 645. Baker Fern Al., p. 58.—Fronds trailing 6-12 in. l., decomposed. Branches erecto-patent, short compound. Rachises rounded beneath, angled on the face. Major leaves apart on the main rachis, closer outwards, touching on the final parts, oblique 1-1 $\frac{1}{2}$  li. l. acute, light green, firm in substance, inequilateral, the base cordate, the upper side being broadened over-lapping the rachis, and spinulose

edged. Minor leaves  $\frac{1}{2}$ – $\frac{3}{4}$  li. l., ovate and freely cuspidate. Spikes copious, 2–4 li. l.,  $\frac{1}{2}$  li. w., tetragonal; bracts keeled, ovate, sharply pointed.

Dominica; gathered by Dr. Murray. Frequent in the West Indies but as yet only discovered in one of the British Islands.—Porto Rico, Guadeloupe, Martinique.

23. *S. potaroensis*, JENM., Gard. Chron. Vol. 2, 1887.—Fronds quite prostrate, with delicate filiform roots at the joints, 2–4 in. l., with short distant alternate branches, which are simple or again shortly branched, flaccid and delicate. Rachises very slender and thread-like, brightly, stramineous, leafy to the base 2–2 $\frac{1}{2}$  li. w. over all. Major leaves spreading, distant, becoming gradually contiguous, but not touching, on the outer parts; obliquely ovate, broadly acute, obliquely cordate but narrowed at the base, the superior base very slightly auricled, 1 $\frac{1}{4}$  li. l.,  $\frac{3}{4}$  li. b., the margin plain; colour light straw green. Minor leaves much reduced, distant, situated at the base of the major, inequilateral, attached by the inner side of the base obliquely ovate, cuspidate about  $\frac{1}{4}$  li. l. Bracts ovate-lanceolate, imbricating but slightly open.

Guiana; Jenman, n. 1818. Gathered in ravines in the forests near the Kaieteur Fall. A species well marked by its bright straw colour, very slender copious yellow rachises, distant ovate, lateral leaves, which seem at sight, though they are not really, narrowed equally each way and very minute medial ones. The latter are so small that they can only be seen by the aid of a lens. When a frond is looked at on the under side with a lens they are seen projecting like a small auricle against the inferior base of the major leaves. In the longer spikes some of which are nearly half an inch long the bracts are imbricated moderately firmly, but in the shorter ones, a line or so long, they are lax, and seem as is often the case in that state somewhat disposed to be, but are not resupinate.—Endemic.

24. *S. producta*, BAKER, Fern, Al., p. 56.—Fronds prostrate or sub-erect, rooting at the base and on the stem at intervals as well, an inch or two to a foot l., oblong-lanceolate or ovate with contiguous nearly uniform, erecto-spreading branches 1–2 or 3 in. l. Major leaves oblong, spreading horizontally, deeper and auricled on the upper side at the base, the lobe over-lapping the rachis beneath, 1–1 $\frac{1}{2}$  li. l.,  $\frac{1}{2}$  li. or over w., very faintly spinulose, ciliate on the rounded base, those of the rachises a little apart, of the final branches close but not imbricating. Minor leaves ovate cuspidate, somewhat keeled, and partly over-lapping,  $\frac{1}{2}$ –1 li. l., less w., the margins spinulose-ciliate. Spikes square, copious, often crowded round the frond,  $\frac{1}{4}$ –1 in. l., bracts densely imbricated not or little spreading.

Guiana; Appun n. 196 and 198, Drake; Jenman, 783, 2,325 and 1,483. A very common species growing by the banks of rivers and in damp places, often submerged, forming dense patches or beds. The lateral leaves are rather broad, oblong, or ovate-oblong, spreading horizontally. The intermediate ones are freely cuspidate with spinulose margins. I have gathered it on the banks of most of the rivers of Guiana that I have visited.—Northern Guiana to Brazil.

25. *S. marginata*, SPRING, Mon. Lycop., 11, 211, Flora Brazil, p. 127. Baker, Fern, Al., p. 61. Lycopodium H.B.K.—Fronds with slender but firm and stiffish stems rooted at the base, jointed, stramineous, with laxly scattered leaves several inches to a ft. or over l., with sharp sub-distant or distant, 1–2 pinnated branches which are 2 li. w. over the leaves, rachises terete, much exposed



between the scattered leaves. Major leaves oblong, spreading nearly horizontally with their own width or more between them not cordate or auricled at the base, the upper side rather deeper than the lower and faintly ciliated on the edge, acute pointed  $\frac{3}{4}$ -1 li. l.,  $\frac{1}{2}$  l. w. Minor leaves minute, ovate-lanceolate, acuminate, inequilateral, slightly over-lapping on the final branches. Texture firm, colour light green. Spikes very short hardly more than 1 li. l., bracts keeled, slightly open.

Guiana; this seems to be in growth a semi-erect species which probably supports its slender fronds on other vegetation. The branches are rather distant, always short in relation to the length of the fronds, varying from 1-3 in. l. The habit of growth is probably that of *puberula*.—Central Brazil.

26. *S. caudorhiza*, BAKER, Fern Al., p. 59.—Fronds, rooted at the base, 8-18 or more l. ovate, with contiguous pinnae in the lower part, but extending above into a lax narrower state, having short distant branches, the lower of which (not lowest, which are less) 2-5 in. l. erecto-spreading, repeatedly pinnate. Major leaves of main rachises spreading, about  $1\frac{1}{4}$  li.,  $\frac{3}{4}$  li. w. acutely pointed, rounded and nearly equal-sided at the base, with once or twice their own width between them. Minor leaves cuspidate, attached obliquely, the margins very faintly ciliate. Leaves of the branches the same shape but only half the size, close but not imbricating. Spikes 2-3 li. l., bracts keeled, somewhat spreading.

Guiana; Surinam only, collected by Hostman in 1841. The growth seems to be sub-erect, as there are no roots along the frond between the base and the outer elongated part, where they occur at the joints. The minor leaves are quite in a line with the rachis, and have sub-lateral attachment. The primary rachis is  $3\frac{1}{2}$  li. across the leaves, the others are reduced branch by branch, till the final ones are only 2 li. w.—Endemic.

27. *S. guyanensis*, SPRING, Mon. Lycop. II. 34. Baker, Fern, Al., p. 56.—Stems decumbent, above a foot long, sub-terete, copiously pinnate, the branches but little compound. Major leaves spreading, linear-oblong, middle sized, sub-obtuse, three times as long as broad, nearly equilateral, serrulate, sub-cordate, and shortly ciliate on the upper side at the base. Minor leaves very small, cordate-ovate, with a large cusp. Spikes square,  $\frac{1}{2}$  in. l., bracts ovate, cuspidate strongly keeled.

Guiana; gathered by Leprieur in Cayenne. This I have not seen. Mr. Baker says it is a near ally of *S. Gardneri* of the Organ mountains, Brazil.

28. *S. macroclada*, BAKER, Fern Al., p. 61.—Growth more or less prostrate, with simple thread-like roots a few in. l., springing at intervals from the jointed flexuose rachises. Branches very long and attenuated, having contiguous erecto-spreading branchlets at the base about 1 in. l. which gradually become distant and less than a  $\frac{1}{2}$  in. l. in the extended outer part. Breadth over-all  $2\frac{1}{2}$ -3 li. Rachises ribbed or angular, exposed beneath. Major leaves oblique or in cases nearly horizontal, oblong, the under margins up-curved at the acute point, base sub-cordate, deeper on the upper side than the lower margins not ciliated, 1- $1\frac{1}{2}$  li. l. and half as w., imbricating. Minor leaves lanceolate-acuminate, inequilateral, attached on the inner side,

the outer side with a rounded auricle developed below this point, margins plain or very faintly serrated; texture firm; colour light green. Spikes short, bracts keeled.

Guiana; Appun, n. 802. There is only one specimen in the Kew Herbarium, on which no locality is stated by the Collector. The species is well marked by the long attenuated character of the primary branches, secondary ones being all short. The specimen in question is over 2 ft. l., was apparently gathered near its base, and has about half a dozen of the long branches all of which run much in the same line. From the up-curved under margin, the lateral leaves have the appearance of being slightly falcate.—Endemic.

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29. *S. minioides*, A. Br.—BAKER, Fern alb., p. 64.—Fronds a foot or more long, half as wide, three times branched, lax—sub-prostrate and rooting from the axils of the branches. Branches alternate,  $1\frac{1}{2}$ -2 in. apart, 3-5 in. l., the upper ones shortened, but not gradually, not delicate in texture, bright green, the rachises moderately firm, but bending when bearing the weight of the frond. Final branches  $2\frac{1}{2}$  in. w. over the leaves; Primary rachis leafy and branched to the base; Leaves of this lax with twice their own width between them, becoming gradually closer in the subsequent divisions till they slightly imbricate in the final, and are much smaller; the major ones  $1\frac{1}{2}$ -2 li. l.,  $\frac{3}{4}$ -1 li. w., acute at the point or blunted, broadest at the base, the upper side deeper than the lower, the base sub-cordate but not auricled, and fringed with long wool-like hairs; those of the ultimate branches rather smaller and less woolly round the base. Minor leaves quite ascending, often rather curved ovate, the point acuminate, cuspidate, lax within, but those of the final branches overlapping. Spikes short (in the specimens seen), bracts keeled, rather open.

Trinidad; Sherring.—This is allied to *affinis* and *epirhizos* of this flora, which it resembles in size and somewhat in habit, but the branching is more regularly pinnatifid. It is a well-distinguished species however, and the woolly fringe around the base of the leaves (which spread over the primary rachis, also making that appear as if woolly too), is an unmistakeable character for its identification, but there is less of this vestiture on the outer branches than the inner. As the branches which spread right and left in an oblique direction are not much reduced one after the other the fronds bear nearly the same width from base to apex. My specimens are hardly mature, and it is likely the spikes are longer than I have described.—Venezuela, New Granada, Ecuador, Bolivia and Panama.

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30. *S. Breynii*, SPRING, Mon. Lycop, II., 119. Baker, Fern Al., p. 54.—Fronds prostrate, with long straight roots at intervals beneath, 1- $1\frac{1}{2}$  ft. l., dark-green, herbaceous, oblong, with two or three frond-like divisions, often springing from a common base, the same shape and size, branched alternately throughout, the primary rachis stiffish. Branches contiguous but not close, 2-3 in. l. with shorter alternate branches. Major leaves spreading horizontally, linear-oblong, close or imbricating, inequilateral, the upper base auricled and deeper than the lower, over-lapping and very faintly pubescent, concealing the rachis beneath, 2- $2\frac{1}{2}$  li. l.,  $\frac{3}{4}$  li. w., the point sub-acute. Minor leaves ovate, cuspidate, the margin finely serrate, inequilateral, attached obliquely, the outer rounded side being much deeper than the inner, the two series close and ightly

over-lapping in the lines, rather keeled toward the freely cuspidate point. Spikes  $\frac{1}{2}$ –1 in. l., 4-gonal, often 2 to a final branch, or forked; bracts densely imbricated, sharply keeled and pointed.

Guiana; Schomburgk, n. 982. A large species most like *S. epirhizos* and *S. affinis* in its flat spreading parts, the leaves of which lap one over the other on the surface and spread horizontally. The immediate leaves are very unequal sided, run direct with the rachis and are attached on the narrow or inner side of the base. The long slender white roots from the joints are numerous. Both above and below the rachises are quite concealed by the foliage. Gathered by Leprieur as well as by Schomburgk.—Guiana and Brazil.

31. *S. affinis*, A. Br. BAKER, Fern Al., p. 63. *S. Poeppigiana*, var. *guyanensis*, Spring, Mon., Lycop., p. 218.—Fronds 1–1 $\frac{1}{2}$  l., branched alternately nearly from the base, sub-prostrate throwing out long, simple, thread-like roots from the points, which like the rachises are stramineous and bright. Branches 2 $\frac{1}{2}$ –3 or 4 li. w. over the leaves, herbaceous in substance and rachises weakly, though thickish. Leaves distant on the main rachises, but close or slightly imbricating on the branches; Major ones linear-oblong, spreading sub-horizontally, the base not cordate, the under margin up-curved at the acute point, the upper side very little deeper than the lower, 1 $\frac{1}{2}$ –2 li. l.,  $\frac{3}{4}$  li. d., the margins naked. Minor leaves ovate-lanceolate or lanceolate with a rounded auricle at the base of the longer outer margin, the point rather cuspidate. Spikes  $\frac{1}{4}$ – $\frac{1}{2}$  in. l., rachises enlarged at the base by the macrospores.

Guiana; Jenman, n. 551, 1497, 2061, 2134. Very close to *S. epirhizos*, but in that species the stems are not stramineous and bright, and the leaves on the primary rachises are close and all including the minor ones, are broader than in this, with the rachises articulated at the joints, which this does not show. It is a very common species forming large beds in the forests which border most of the rivers of the country.—Endemic.

32. *S. epirhizos*, SPRING, Mon. Lycop. II., p. 218. Baker Fern Al., p. 81.—Fronds sub-ascending, rooted at the base, and with long simple thread-like roots upwards some distance at joints, 8–12 or more in l., 2–3 in. br., branches short and again shortly branched, or some developing into branches as large as the primary fronds. Major leaves spreading horizontally, oblong, acute, or sub-acute at the point, the base deeper on the upper side but not auricled to lap over the rachis, except in the final branchlets and the margins quite plain, 1 $\frac{1}{2}$ –2 $\frac{1}{2}$  li. l.,  $\frac{3}{4}$ –1 li. w. at the base, apart on the main rachis but becoming gradually imbricating on the final ones. Minor leaves 1–1 $\frac{1}{4}$  li. l., obliquely ovate, unequal sided, acute pointed, attached on the inner side at the base of the narrower half, slightly over-lapping margins quite plain. Rachis broad and prominent, flexible, fully exposed on the under side; texture herbaceous, colour dark-green. Spikes 2–10 li., decrescent, the shorter much bulged out at the base with the macrospores which are usually large.

Guiana; Cayenne, Leprieur; Surinam, Hostman; British Guiana, Jenman n. 645, 3987, Demerara, Mazaruni and Issororo Rivers. The branches are very flat, and measure 4–5 li. over all. As in *S. caudorhiza*, the lateral leaves do not lap on the upper base over the rachis, except in the outer branches where the character is soon lost. The bulging out of the bracts at the base of the spikes with the large macrospores is a good feature. It is one of the limp weakly species though the parts are relatively large.—Endemic.

33. *S. patula*, SPRING.—Fronds light green often silvery beneath membranous quite prostrate tri-quadri-pinnate, 4-6 or 12 in. l., 1-3 or 4 in. b., branched and often reduced from the base upwards, rachis distinct throughout, very slender, and extended beyond the upper decrescent branches in a thread-like tail quite laxly clothed throughout with minute leaves of one kind only which are not spinulose pointed, the outer margin at the base spinulose ciliate. Primary branches spreading about 1. li. w. over the leaves, the inferior ones with a terminal tail like that of the primary rachis. Leaves imbricated, the major spreading oblong the point acute but not pungent, outer margins ciliate,  $\frac{3}{4}$  li. l.,  $\frac{1}{4}$ - $\frac{1}{3}$  li. w. Minor leaves ovate spinulose-pointed, spinulose-ciliate on the outer margin  $\frac{1}{3}$ - $\frac{1}{2}$  li. l. Spikes short  $\frac{3}{4}$  li. w. 4-stichous, bracts loose ciliate-edged or not. Sporangia minute.—Baker Fern Al., p. 46.

Jamaica; infrequent on open rocks and banks at various altitudes up to 3,000 or 4,000 feet. This like *setigera* is marked by the slender elongated rachis clothed above and below the frond portion proper with small difform leaves of one kind that runs through the frond extending tail-like at the top, and also in the principal branches.

The contrast is the greater owing to the leaves of the intermediate parts being close and imbricated, though distinctly 4-stichous, the spikes are so short and the bracts so lax that they are not very distinctly angular. The leaves of the stem and rachis resemble in character the lateral leaves of the branchlets, but are reduced in size and more ovate in shape.—Endemic.

34. *S. setigera*, JENM.—Stems firm, slender, sub-erect, clothed with firmly appressed minute leaves throughout, ribbed when dry and stramineous. Fronds compact or lax somewhat variable in shape, ovate, deltoid or lanceolate, extending into a long slender radicans flagelliform tail tripinnate, the primary branches sometimes extended like the main axis of the frond, and radicans dark green, firm. Major leaves on the main axis contiguous or close, obliquely and flatly spreading; sub-cordate, ovate, deltoid, hardly acute,  $\frac{1}{2}$ - $\frac{3}{4}$  li. l., less w., the base ciliate; those of the outer branches imbricating, oblong or linear-oblong, obliquely acute-pointed, the branches 1-1 $\frac{1}{2}$  li. w. over the leaves. Minor leaves ascending close or contiguous, ovate, spinulose pointed, inequilateral, the base cordate, ciliate or spinulose edged, all round about  $\frac{1}{4}$  li. l. and extending to the end of the thread-like tail which is devoid of major leaves. Spikes 1-2 li. l. the shorter ones lax with open convex keeled acuminate bracts, pressed back by the large sporangia.

By its habit of extending and rooting at the end of the tail, and there producing new growth, this resembles in habit *patula* as before said but is a larger and darker coloured plant. The slender unbranched stem at the base is 2-6 in. l., the frond 3-0 in. and the extended outer part from a few inches to a span or more. Sometimes short alternate sub-distinct branches extend upwards on the prolonged outer part, thus making the frond a foot or less long.—Jamaica, Wilson 136, Morin 503, and Sherring.

35. *S. flagellata*, Spring., Mon., Lycop. II. Baker, Fern Al., p. 73. Syn. Gen. Selaginella.—Fronds trailing, intermatted, half a foot long, the lower parts copiously compound, the branches excurrent and whip-like at the end. Major leaves ovate-lanceolate, very acute above a line long, pellucid, bright green, more produced on the upper side of the mid-rib, rounded at the base, shortly ciliated, and imbricated

over the stem. Minor leaves one-third as long, ovate-acuminate, falcate convergent. Spikes  $\frac{1}{8}$ - $\frac{1}{2}$  in. l., bracts very acuminate, strongly keeled.

Guiana; on rocks on the banks of the streams of the Upper Oyapok, Leprieur. This I have not seen, and have quoted from Mr Baker's synopsis.—Endemic.

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36. *S. stolonifera*, SPRING.—Fronds trailing a foot or more l., extended into a whip-like tail at the end freely decompound. Rachis angled, jointed at the nodes. Branches short compound. Major leaves apart on the rachises close in the outer parts, oblique, oblong or oblong-lanceolate, acute, sub-cordate, nearly equilateral but laterally inserted, the superior base more rounded and ciliate not imbricated on the rachis, firm in substance and stiffish 1-1 $\frac{1}{2}$  li. l. Minor leaves  $\frac{1}{2}$ - $\frac{1}{3}$  as long as the major inequilateral, the inward slightly curved, sharply pointed. Spikes  $\frac{1}{4}$ - $\frac{1}{2}$  in. l., tetragonal,  $\frac{1}{2}$  li. w., bracts imbricating keeled, acute, Baker Fern Al. p. 61.—Lycopodium Swartz.

Gathered by Swartz in Jamaica, but not since his day.

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37. *S. vernicosa*, BAKER, in Trans. Lin. Soc., New ser., Bot. II., t. 56 A. Fern Al. p. 78.—Fronds rooted at the base, stiff 3-6 or more in. l., with short alternate distant or sub-distant divaricating branches on which the fertile branches are produced in a similar and divaricating manner. Primary rachis 1 $\frac{1}{2}$  li. across the leaves, the branches 1-1 $\frac{1}{2}$  l. across; convex on the under side, concave on the upper. Major leaves densely imbricating obliquely spreading auricled and deeper on the upper side, the end rounded, the upper margin much curved and finely spinulose-serrate, the under naked, and nearly straight, about  $\frac{1}{2}$  li. l., less w. Minor leaves very densely imbricating, the two lines also laterally overlapping, ovate, acute, equilateral, both margins freely ciliate, about  $\frac{1}{3}$  li. l. Spikes 3-4 li. l. terminating all the branches, bracts keeled, rather open.

Var. *oligoclada*, Baker, tab. 56, B. Var. *simplicifrons*, Jenm. Branches erect, all reaching forward parallel with each other; rather narrower. Margins of the leaves less ciliated. Spikes firmer and more angular.

Guiana; in Thurn, n. 226. Roraima, base of the cliff. This is a stiff rigid species, with densely imbricating leaves, that entirely enclose and conceal the rachises. The physiognomy is quite different from that presented by any of the other species. The variety *oligoclada*, in Thurn, n. 381, was gathered lower down. It has no spreading lateral branches like the type; they ascend side by side, are simple, and are forked when divided, the shorter ones being fertile. Possibly it is a distinct species.—Endemic.

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38. *S. erythropus*, SPRING, Mon. Lycop., p. 155, Baker Fern Al., p. 103, Lycopodium Mart.—Stems bright red, erect, rooted at the base, stiff, 2-4 in. l., Fronds erect, de-compound deltoid. 2-4 in. l., inferior divisions the same shape as the frond, tripinnate ultimate parts contiguous, 1-1 $\frac{1}{2}$  li. b., over the leaves,  $\frac{1}{2}$ -1 in. l. Major leaves contiguous oblong or ovate lanceolate appressed firm, green, inequilateral 1-1 $\frac{1}{2}$  li. l., the rounded superior base ciliated and dilated over

the rachis. Minor leaves  $\frac{1}{2}$ – $\frac{3}{4}$  li. l., inequilateral ovate, cuspidate. Spikes tetragonal,  $\frac{1}{2}$  li. w., 2–4 li. l., outer bracts keeled, imbricating freely and cuspidate.

West Indies; most resembling in habit and aspect *cuspidata*.—Central Brazil and Guatemala to Chili.

39. *S. cuspidata*, LINK.—Stems erect, rigid, terete,  $\frac{1}{2}$ –1 ft. l., 1 l. thick, sometimes branched generally with few or several abortive spur-like buds, 1–2 li. l., along the sides clothed throughout with imbricating ciliate-edged clasping leaves which are 3–4 serial and all of one kind. Fronds erect stiff, light green, sub-ovate or ovate, deltoid, usually broadest at the base and narrowed upwards, 3–5 in. each way, repeatedly pinnate, the branches very dense and close,  $\frac{1}{2}$ – $\frac{3}{4}$  li. w. Major leaves very imbricating, ovate, acuminate,  $\frac{3}{4}$  li. l.,  $\frac{1}{2}$ – $\frac{3}{4}$  li. w., the inner or upper margin ciliate. Minor leaves about half the size, spinulose pointed, faintly denticulate towards the point inequilateral, the double series imbricating one with another. Spikes very numerous occupying all the branches densely, 4 stichous,  $\frac{1}{4}$ – $\frac{3}{4}$  in. l.,  $\frac{1}{2}$  li. w. Bracts faintly ciliate on the margins. Sporangia very minute.—Baker Fern, Al., p. 89.

Jamaica; infrequent on open banks and way sides in the Port Royal mountain at 2,000–4,000 feet altitude, having stiff erect stems, with a spreading usually deltoid frond at the top, very dense in all its parts. The pinnæ more or less over-lap, and the branchlets are rather concave on the upper side and convex or almost keeled on the under. Throughout, the leaves are so very densely imbricated, that no part of the stems or rachises is visible. The spikes are long, square edged, the sides rather concave.—Cuba, Mexico, Guatemala, Venezuela, and New Granada.

40. *S. flabellata*, SPRING, Mon. Lycop. p. 174, Gr. Fl., B.W.I., p. 646, Baker Fern Al., p. 98, Lycopodium Linn.—Stems 6–12 in. l., strong, erect, rooting at the base. Fronds, erect or sub-erect decomposed, deltoid in general outline, the primary divisions much the same shape, the large tri- or quadri-pinnate ultimate divisions close or contiguous,  $\frac{1}{4}$ –1 l.  $1\frac{1}{2}$ –2 li. b. over the leaves. Major leaves  $\frac{3}{4}$ –1 l. l., spreading obliquely near, ovate, acute, firm in substance, bright green, the base rounded and unequal, the upper side dilated and imbricating over the stem and ciliated. Minor leaves ovate-cuspidate, inequilateral  $\frac{1}{4}$ – $\frac{1}{2}$  li. l. Spikes tetragonal, firm  $\frac{1}{4}$ –1 in. l., lower bracts open, upper imbricating and keeled.

St. Kitts, Dominica and St. Vincent; a large widely spread species in tropical America, but not very general in the West Indies, also Asia and Polynesia.

41. *S. Parkeri*, Spring, Mon., Lycop., p. 226. Baker, Fern Al. p. 104. *S. lucidinerva*, Spring, Lycopodium Parkeri, Hook et Grev., *L. plumosum*, Aublet.—Stems strong, quite erect, sub-angular or quadrate upwards, stramineous, jointed at intervals sparsely furnished with appressed leaves and spreading by stoloniferous shoots, which spring from the joints and trail on the ground or ascend banks, rocks, or the base of trees 6 in., 1 ft. over l. Fronds spreading from the top of the stems, digitato-pedate or flabellate, 4–10 in. each way, composed of numerous forked, spreading pinnate branches with a flexuose rachis 3–4 $\frac{1}{2}$  li. w. over all. Major leaves spreading horizontally, close in the final branches imbricated, oblong, the under margin

curved upwards at the acute point, nearly equal sided, the base semi-cordate with a small auricle on the lower side  $1\frac{1}{2}$ -2 li. l.,  $\frac{3}{4}$  li. w., not expanded within; Margins plain or faintly serrate on the rounded but unenlarged upper side. Minor leaves lanceolate-acuminate or on the main rachises sub-ovate, attached by the base of the inner side, that of the outer being extended below this into a small auricle,  $\frac{1}{2}$ - $\frac{3}{4}$  li. l., margin not ciliated. Texture firm, rachises stiff, colour bright green. Spikes 2-6 li. l., often enlarged at the base with the large macrospores; bracts keeled, edges naked, slightly spreading in the shorter spikes.

Var. *S. stellata*. SPRING, Mon. Lycop. II., p. 228, Fl. Brazil, p. 129. *S. calcarata*, A. Br.—Branches rather narrower and the leaves consequently smaller. Fronds more regularly pinnate than flabellate, the main rachis extending into a long radicaunt tail. Spikes 4-6 li. l., quadrate.

Var. *S. pedata*, KLOTZCH, in Linnæa. XXVIII, 521.—Leaves rather smaller and the branches consequently narrower. Spikes quadrate from  $\frac{1}{4}$ -1 in. l.

Guiana; gathered by all collectors, marked among local species by its erect flabellate, or often digitate habit, zig-zag rachises, and the leaves of both kinds slightly auricled on the outer side of the base, at the same time it is most variable of species. As the leaves do not over-lap the rachises, the latter are exposed beneath, but above they are quite concealed in all the outer branches. The shorter spikes are often bent aside by the large macrospores being on one side and when very short are as broad as long looking nut-like at the ends of branches. Sometimes the fronds or stems produce depauperated branches with small lax rather rounded leaves, which look like a totally different species. Often the repent much extended branches ascend stumps or the butts of trees producing fronds at distinct intervals as they extend. None of the states of this species is quite constant to a fixed outline of frond and in any good set of specimens it varies from digitate or flabellate to regularly pinnatifid. The varieties have the same range as the type.—Brazil, in the Amazon valley.—(See new sps. in Addenda.)

42. *S. Hankeana*, SPRING, Mon. Lycop. p. 187, Baker Fern, Al., p. 102.—Stems erect, strong, angular clothed with scattered leaves. Fronds erect, regularly pinnate or flabellate, 5-8 in. each way, firm, dark green above, silvery beneath. Pinnæ numerous, much branched and crowded, so that the habit is often plumose in growth; rachises 3-4 li. w. over all. Final branches  $1\frac{1}{2}$ -2 li. b. Leaves of the former apart, of the latter, close, spreading obliquely oblong, acute, the base cordate and rather auricled, the rounded and upper side ciliate, the larger  $1\frac{1}{2}$ -2 li. l., and  $\frac{3}{4}$ -1 li. w., the smaller half that size. Minor leaves minute, ovate, terminating in a hair-like awn, rather inequilateral the margins faintly serrate. Spikes very small, a li. l. with small, laxly spreading, bracts which are hardly keeled.

Guiana; in Cayenne, gathered by Leprieur and Sagot. Well marked by the much-crowded habit. Mature fronds when pressed have the parts lying one over the other. The beautiful silver underside, and very short loose spikes in which the bracts are hardly changed in character from the intermediary leaves and the sporangia are fully exposed, are also good distinguishing characters. It resembles most in the outline of the fronds some of the forms of Parkeri.—Guiana, Brazil and Bolivia, Chili.

43. *S. puberula*, SPRING. Mon. Lycop. II., Baker Fern Allies, p. 101.—Stems repent, throwing up close ascending stems which are terete, stramineous or brown below and glossy with scattered appressed leaves, and no branches for a space 3–6 in. from the base. Fronds much elongated, 1–2½ ft. l. or more, 2–5 in. br., but generally about 2–3 only, rachis like, the stems, terete. Branches alternate 1–2 in. l., as much apart, erect spreading, again branched final ones 1–1½ in. l., 1–1½ w. over all. Major leaves imbricating, spreading nearly horizontally, slightly curved to the acute point, broadest at the base, cordate and rather auricled, the upper side wider and ciliate-edged, ½–¾ li. l., about half as wide; the minor leaves imbricating minute, sub-equal-sided, attached by the rather shorter inner base, ovate, mucronate, ⅓ li. l. Spikes 4, stichous ½–1¼ in. l., enlarged at the base or not with the macrospores.

Guiana; Rich. Schomburgk, n. 979. This is clearly a semi-scandant species. It varies slightly in the ciliation or nakedness of the leaves, and in the stem, being puberulous or not. It has a repent stem from which the fronds are thrown up at short intervals apart. These have a petiole clear of branches, a few inches long, above which the narrow frond extend 1½–2 ft. or more, supported on bushes or other surrounding growth. The slender terete main rachis is exposed to the top, but furnishes with scattered leaves, which are in three series and appressed to the surface, in a line with the rachis, and therefore distinct in character from the lateral spreading leaves.—Guiana, Brazil and Peru.

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#### ADDENDA.

NOTE.—The following two new species were not included in Jenman's numbered arrangement in M.S.S., and are therefore given separately. A reference to the descriptions will however show their affinity.

*S. humile*, JENM., n. sp.—Stems prostrate or sub-erect, very short slender leafy to the base; fronds once or twice branched on both sides, ½–1½ in. l., ¼–1 in. w., pale straw green, main rachis and branches angular 1–2 li. w. over the leaves. Major leaves spreading, lax; not imbricating linear-oblong sub-acute, the base oblique, ¾–1 li. l., not ciliate, edged minor leaves minute, ovate, conspicuously aristate, slightly keeled or not, densely imbricated; spikes very short, rather flattened, dense, keeled, cuspidate.

Trinidad, W. Indies.—Coming in between *S. caribense*, *S. albonitens*, a very small, soft delicate species.

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*S. mazaruniense*, JENM. n. sp.—Stems stout, stiffly erect, one to two spans long, sub-angular, or cylindrical ligneous brown or stramineous, laxly clothed with appressed sub-ovate scales like leaves, equally from base to top, the stem showing freely between. Fronds ample, quite erect, flabellate 1–1½ ft. w. and deep, consisting of several spreading dichotomously branched flat divisions, the lower largest and more compound, the branches spreading and ¼ to ⅓ in. wide tapering or not outwards the fertile truncate at the top 4–10 in. l., the margins serratiform, major leaves spreading, falcate imbricating, acute, slightly cordate at the oblique base, a line wide, 3 lines long, not ciliate; minor leaves minute, appressed ovate-cuspidate in a



double series, very dense. Spikes 4-gonal tail-like 2-3½ in. l. pendent bracts densely imbricating, sharply keeled, mucronate.

B. Guiana; upper regions of the Mazaruni River forming dense thickets. The finest species in the Colony, the barren fronds resembling most those of *S. Parkeri* but differing in particulars. Its principal difference from any other local species is in the long, slender, tail-like spikes, resembling those of several *Lycopodiaceæ*, such as *L. guadeloupianum*, though not branched.

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## GENUS II.—ISOETES, Linn.

Sporangia contained in the axils of the leaves, partly immersed in the interior of the base, the macrosporangia in the inferior, microsporangia in the superior ones. Macrospores spherical; microspores 3-gonal. Leaves herbaceous, from a few inches to a foot or more high, springing in a dense rosette from a thickened 2-3 lobed corn-like rootstock, acoulescent. the expanded bases clasping, tapering thence upwards to the acuminate often convolute point.

These, the Quillworts, are herbaceous bog or aquatic plants with numerous leaves, appressed together at their expanded bases from whence they taper rapidly to the much reduced point, the height varying with the different species, forming a dense rosette. The sporangia are concealed in the clasping bases, and must be sought for by removing the leaves. I have seen no Jamaica species, but it is possible the genus may be represented in the higher regions as it is in the countries around. There are five tropical American species, found mostly at high altitudes, extending from Cuba to the Andes of Peru.

*I. cubana*, Engleman. Rootstock tri-lobed leaves, few or numerous, filiform, reaching from a few to several inches long, acuminate, the base delated—and clasping with relatively small sporangia, macrospores and microspores.—Cuba.

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## ORDER VII.—MARSILEACEÆ.

Capsules scattered or serial on the rootstock or the base of the petioles, globose or ovate-oblong, coriaceous 2-4 valved, dehiscent sporangia membranous, indehiscent, spores of two kinds macrospores and microspores. Rootstock free-creeping, slender vernation circinate. Leaves linear-filiform, or 4-foliate at the summit of slender erect petioles.

This order like the preceding contains two dissimilar genera. One, *Pilularia* is confined to temperate regions, the other, *Marsilea* to the warmer temperate and tropical.

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1. *M. polycarpa*, Hook and GREV.—Rootstock thick as small cord, free creeping, naked, with filiform long descending roots and scattered ascending petioles, that are slender 4-8 in. l., naked. Leaves 4-foliate, terminal on the summit of the petiole, leaflets wedge shaped the outer edge rounded, at first folded together spreading subsequently;  $\frac{3}{4}$ -1¼ in. diameter, each way sessile membranous, herbaceous. Venation reticulated, fine, with no primary ribs, anastomosing, forming narrow elongated linear meshes. Sporangia subglobose 1½ li. diameter, serial on the lower part of the stipes above a vacant space at the base, shortly stipitate, a few or numerous,

densely tomentose but becoming eventually naked.—Icon. Fil. t. 160. Baker Fern, Al., p. 139. *M. brasiliensis* Mett.

In ponds and trenches, lagoons and other still water, covering where found the surface densely, with oxalis or clover-like foliage, and spreading over large areas. The Jamaica plant, gathered by Purdie, Feb. 1844, in ponds at Hodge's Penn, St. Elizabeth, is *M. subangulata* A. Br. and regarded by Mr. Baker as a variety of *polycarpa*. It is much smaller with densely tomentose rootstock and buds with fewer and smaller sub-angular very tomentose capsules. Another small species with tomentose capsules, *M. Berterii* A. Br. is found in St. Domingo. A specimen gathered by Miss Taylor at the "Cedars, St. Catherine," is larger but not in fruit.—Jamaica. (*Anatto Bay Road, Hart*).

## ORDER VIII.—SALVINIACEÆ.

Annual aquatic, floating, herbaceous plants, of small or diminutive size, with imbricating or pinnatifid fronds, and membranous major and minor capsules, which are situated in the axils of the leaves beneath, or in inferior clusters on branched filiform threads, and that contain separately sporangia of two kinds.

These are, in size inconsiderable aquatic herbs which exist usually in great abundance, floating on the surface of still water, and are especially common in Guiana. The known species are about twenty or more, which are spread through the torrid and the warm temperate regions of both hemispheres.

### GENUS I.—SALVINIA, Schreb.

Capsules membranous indehiscient globose, clustered in descending panicles, singly at the end of short pedicels borne among the roots, the smaller which are fewer, superior and on longer pedicels, containing few reticulated macrosporangia; the larger inferior, more numerous on shorter pedicels containing multitudinous reticulated microsporangia. Small floating aquatic herbs communal in habit with serial fronds on a more or less shortly-extended rachis, entire flat or partially folded with close parallel pinnatifid veins, and tufts of numerous, descending simple villous roots.

Like the next, all the plants of this genus bear a common general resemblance, differing mainly in the degree of elongation of the axis, and size, from colour and vestiture of the leaves, etc. The capsules are globose, and hang in loose clusters among the leaves, each one on separate pedicels which radiate more or less from the common axis. Those containing the macrosporangia, though situated above, reach out beyond those containing the microsporangia, which are larger, having pedicels twice or more long. The fruit, roots, and fronds all spring from the joints in the rachis, which is thickness of moderately thin string, the intervening space being destitute.

1. *S. auriculata*, Aublet Fern, Alb., p. 136. *S. rotundifolia*, W. *S. hispida*, H. B. K. *S. biloba*, Raddi.—Rachis horizontal, cork-like, nearly a line thick, puberulous with slight scales, extending a few inches and branching. Fronds contiguous or apart, two at each point spreading at right angles on petioles  $\frac{1}{4}$ – $\frac{1}{2}$  in. l. which are clothed like the rachis, the blades folded at first, rounded, cordate at the base, with rounded auricles  $\frac{1}{2}$ – $\frac{5}{8}$  in. each way herbaceous, cloudy green, pubescent beneath densely strigose above with elongated glands that are divided into three or four filaments at the end, and mixed with finer ones; veins very close and numerous; capsules of microsporangia nearly 1 li. diameter about 2–6 in number, those of the micros-

porangia half the size and about 1-3 both pubescent.—Aubl. Guian. H. 969, t. 367. Fern Allies, p. 136, *S. rotundifolia*, W.—*S. hispida*, H. B. K. *S. biloba*, Radd.

Guiana; In estates' trenches, ponds and ornamental waters, this plant is a pest from the freedom with which it multiplies and the multitudinous numbers of the individual. The capsules are two to nine in number or perhaps more, about from one to three (sometimes none) of each cluster containing macrosporangia. I have not seen Jamaica specimens, but include it to be looked for, for it is probably found on some of the British West India Islands, though not yet recorded.

2. *S. radula*, BAKER, Fern Al., p. 136—Rhizome horizontal, cord or thread-like 1-2 or more in. l., branching puberulous-scaly. Fronds in pairs, at right angles with the axis shortly petioled rather oblong, rounded, cordate at the base but not deeply the auricles rounded,  $\frac{1}{2}$ - $\frac{5}{8}$  in. l., less w.. herbaceous, under side pubescent, upper etigrose colour, metallic green veins close numerous, no fruit seen.

Guiana; Parker, Jenman, n. 1114 and 2213, found in trenches of the coast region near Georgetown and in the lakes of Victoria regia beyond the first falls of the Essequibo River. The leaves are more decidedly oblong, less deeply cordate and often rather smaller than in *auriculata*.—Brazil.

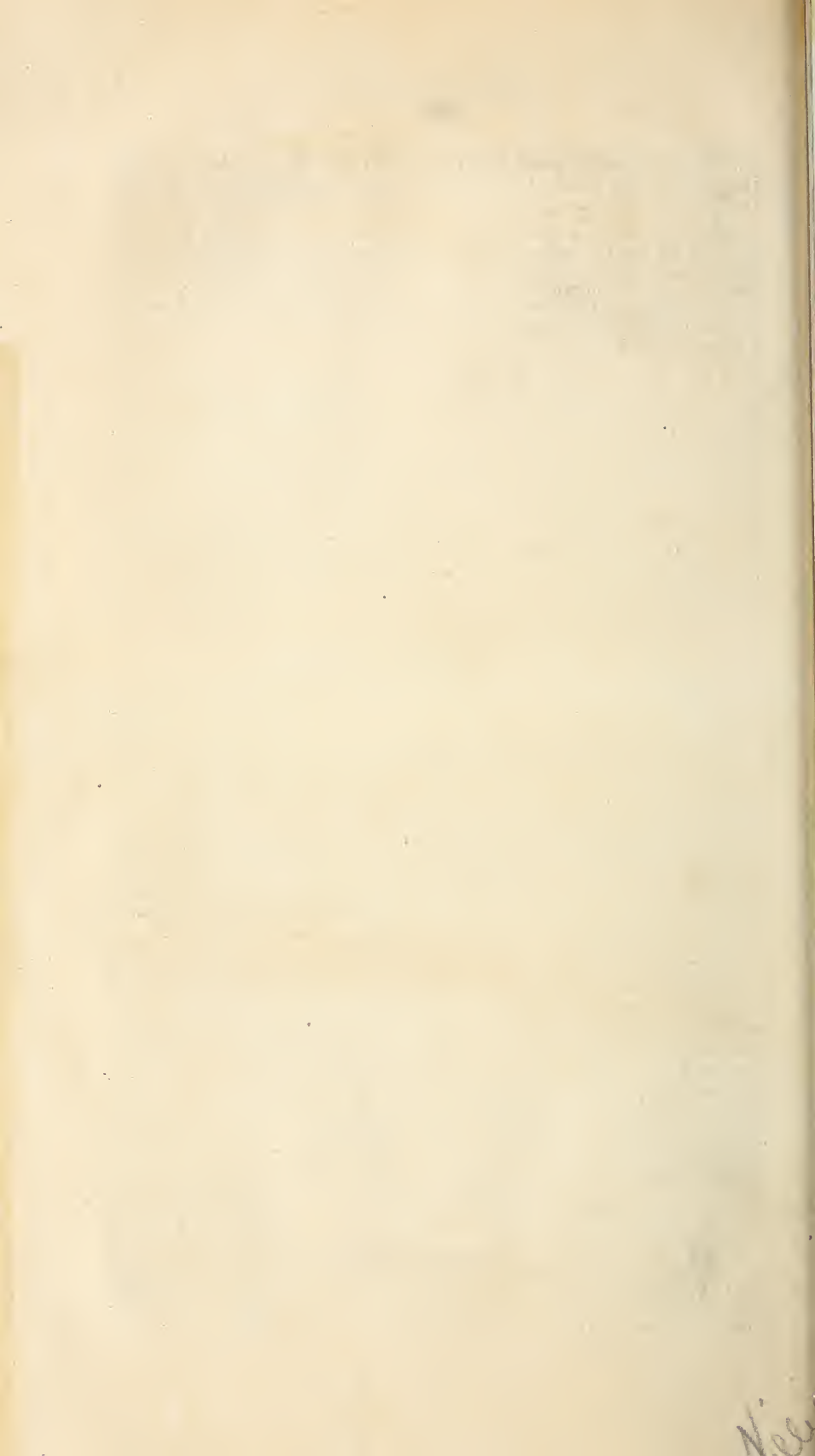
## GENUS II.—AZOLLA.—Lam.

Capsules situated in pairs, in the axils of the leaves beneath, of two kinds membranous indehiscent, the larger sub-globose containing several or many microspores the smaller ovoid, containing a solitary macrospore; very small communal floating weeds branched with minute imbricating leaves in a double series, sessile with no veins, a central rib only in each, the inferior smaller than the superior and descending filiform simple villous roots.

The members of this genus like the last are communal and form a sheet over water, often quite concealing the surface. They are exquisite little plants in structure and colour with minute imbricating leaves varying from green to dark purple in colour, branched in the form of little prostrate trees. The species are about half a dozen, tropical and sub-tropical, found in America, Asia, Africa, and Australia.

1. *A. caroliniana*, WILLD.—Entire plant  $\frac{1}{2}$ - $\frac{3}{4}$  in. each way, deltid or flabellate in outline pinnate or bi-pinnate, obtuse, lower branches longest, the lowest shortly branched again at the ends. Leaves all united at the axis, biserial on each side those of the upper series larger, more fleshy, brighter coloured, more erect, less appressed, subovate,  $\frac{1}{2}$ - $\frac{3}{4}$  li. l., less broad, those of the under side grey, appressed one on the other. Sporangia in pairs, one of each or both of one kind together in the axils of the leaves. Macrosporangia, several times larger, have the microsporangia, globose-oblong, the sack tender, membranous. Spores uniform or variable in size. Spherical pitted or reticulated 6-24 to a capsule. Microsporangia ovoid, dark coloured or striated at each end.—Baker Fern Allies, p. 138.

Guiana; the colour varies from light green to dark purple, but there seems to be two varieties—green shading to pink, and pink shading to deep purple, the former being larger in both plant and leaves. My description is taken from Cuban specimens. (Found in Jamaica by Hart. St. Andrews. Ed.)



# INDEX.

[The *genera* are placed alphabetically, but the *species* are arranged to follow in accordance with their natural affinity.—ED.]

	Page.		Page.		Page.
<b>ACROSTICHUM.</b>		<b>ADIANTUM.</b>		<b>ALSOPHILA.</b>	
Feeii	... 329	lunulatum	... 82	oblonga	... 34
nigrescens	... 329	tremulum	... 82	Eatonii	... 35
flaccidum	... 329	filiforme	... 82	echinata	... 35
Herminierii	... 329	flagellum	... 82	nitida	... 36
stenopteris	... 330	deltoideum	... 83	pungens	... 36
gramineum	... 330	jamaicense	... 83	infesta	... 36
simplex	... 330	lucidum	... 83	armata	... 37
inequalifolium	... 331	dolosum	... 83	ferox	... 37
alatum	... 331	phyllitidis	... 83	aculeata	... 37
viridifolium	... 332	Wilsonii	... 84	paleolata	... 37
chartaceum	... 332	macrophyllum	... 84	Gardnerii	... 38
schlimense	... 332	Kendallii	... 84	nigra	... 38
pallidum	... 332	dissimulatum	... 85	villosa	... 38
lingua	... 332	oyapokense	... 85	rigida	... 38
conforme	... 333	villosum	... 85	parvula	... 39
leptophlebium	... 333	oblique-truncatum	... 86	aspera	... 39
Burchellii	... 334	pulverulentum	... 86	nitens	... 39
latifolium	... 334	caudatum	... 86	gibbosa	... 39
luridum	... 335	serrulatum	... 86	pruinata	... 40
Sherringii	... 335	denticulatum	... 86		
viscosum	... 335	Kaulfussii	... 87	<b>ANEMIA.</b>	
Huacsaro	... 335	obliquum	... 87	aurita	... 360
tectum	... 336	fovearum	... 87	phyllitidis	... 361
lamanarioides	... 336	reductum	... 87	oblongifolia	... 361
magnum	... 336	intermedium	... 88	hirta	... 361
auricomum	... 337	glaucescens	... 88	randioccana	... 362
muscosum	... 337	hirtum	... 88	tomentosa	... 362
cuspidatum	... 338	tomentosum	... 89	Breuteliana	... 362
perelegans	... 338	macrocladum	... 89	filiformis	... 363
lepidotum	... 338	fructuosum	... 89	hirsuta	... 363
Engelii	... 339	Klotzschianum	... 89	adiantifolia	... 363
squamosum	... 339	cayennense	... 90		
decoratum	... 339	tetraphyllum	... 90	<b>ANTROPHYUM.</b>	
hybridum	... 339	triangulatum	... 90	lineatum	... 318
scolopendrifolium	... 340	acuminatum	... 91	lanceolatum	... 318
Boryanum	... 340	obtusum	... 91	cayennense	... 319
apodum	... 340	melanoleucum	... 91	sub-sessile	... 319
raywaense	... 341	nanum	... 92		
cubense	... 341	nigrescens	... 92	<b>ANETIUM.</b>	
spathulatum	... 341	pumilum	... 92	citrifolium	... 317
Aubertii	... 342	cristatum	... 93		
Lindeni	... 342	striatum	... 93	<b>ASPIDIUM.</b>	
siliquoides	... 342	pyramidale	... 94	Plaschnickianum	... 193
villosum	... 343	crenatum	... 94	rhizophyllum	... 194
acuminatum	... 344	concinnum	... 95	glandulosum	... 194
caudatum	... 345	capillus-veneris	... 95	semicordatum	... 195
osmundaneum	... 345	bellum	... 95	juglandifolium	... 195
cervinum	... 345	fragile	... 96	sub-obliquatum	... 196
Fendlerii	... 346	Bessoniae	... 96	mucronatum	... 196
nicotianifolium	... 346	littorale	... 96	triangulum	... 197
alienum	... 347	tenerum	... 97	caudatum	... 198
praestantissimum	... 347	sub-cordatum	... 97	rhizophorum	... 198
serratifolium	... 347	betulinum	... 97	bi-pinnatum	... 198
Raddianum	... 348	cultratum	... 98	latipinnum	... 198
aureum	... 348	trapeziforme	... 98	tridens	... 198
lomarioides	... 349	malaliense	... 98	vivaparum	... 199
cænopteris	... 349	Hewardii	... 99	trapezoides	... 199
Hartii	... 349	olivaceum	... 99		
		Le Preurii	... 100		

## INDEX.—CONTINUED.

	Page.		Page.		Page.
<b>ASPIDIUM.</b>		<b>ASPENIUM.</b>		<b>CERATOPTERIS.</b>	
aculeatum	... 199	Wildenovii	... 171	thalictroides	... 355
Moritsonianum	... 200	Perkinsii	... 171		
christianæ	... 200	rhizophorum	... 172		
melanochlamys	... 201	radicans	... 172	<b>CHEILANTHES.</b>	
capense	... 201	cirrhatum	... 172	radiata	... 106
plantagineum	... 202	cystopteron	... 172	paupercula	... 106
trifoliatum	... 202	eryopteron	... 172	pedata	... 107
meniscoides	... 203	cicutarium	... 172	Reesii	... 107
confertum	... 203	flabellatum	... 173	micromera	... 107
abbreviatum	... 203	suspensum	... 173	microphylla	... 108
		rachirhizon	... 173	marginata	... 108
<b>ASPENIUM.</b>		plantagineum	... 175	tomentosa	... 109
angustum	... 151	Campbellii	... 175		
Appunianum	... 151	Lechlerii	... 175	<b>CYATHEA.</b>	
serratum	... 151	juglandifolium	... 176	Nockii	... 49
loriforme	... 151	callophyllum	... 176	pubescens	... 49
surinamensis	... 151	grandifolium	... 177	jamaicensis	... 50
pumilum	... 152	flavescens	... 177	arborea	... 50
parvulum	... 152	Rœmerianum	... 177	elegans	... 51
ebeneum	... 152	centripetale	... 178	nigrescens	... 51
resilens	... 152	duale	... 178	concinna	... 52
trichomanes	... 153	Shepherdii	... 179	Tussacii	... 52
castareum	... 153	costale	... 179	insignis	... 53
monanthemum	... 153	Desvauxii	... 180	princeps	... 53
formosum	... 154	appollinaris	... 180	gracilis	... 53
Harrisii	... 154	crenulatum	... 180	dissoluta	... 54
Fawcettii	... 155	grammatoides	... 180	Schanschin	... 55
dentatum	... 155	bi-pinnatisectum	... 181	furfuracea	... 55
jamaicense	... 159	expansum	... 181	monstrabila	... 56
firmum	... 156	Hartianum	... 181	vestita	... 56
cultrifolium	... 157	ambiguum	... 182	hirsuta	... 56
abscissum	... 157	radicans	... 182	abrupti-caudata	... 56
obtusifolium	... 157	pallidum	... 182	muricata	... 57
salicifolium	... 158	crenatum	... 182	tenera	... 57
auriculatum	... 158	remotum	... 182	cariboea	... 57
anisophyllum	... 159	arboresum	... 183	oyapoka	... 58
hastatum	... 159	auriculatum	... 183	Purdisei	... 58
pteropus	... 160	semi-hastatum	... 184	portoricensis	... 59
alatum	... 160	monticolum	... 184	Imrayana	... 59
lætum	... 161	Fadyenii	... 185	moniliforme	... 59
marinum	... 161	Franconis	... 185	conquisita	... 60
lunulatum	... 162	conchatum	... 186	pendula	... 60
erectum	... 162	hians	... 186		
harpeodes	... 162	altissimum	... 187	<b>CYSTOPTERIS.</b>	
falcatum	... 163	Taylorianum	... 187	fragilis	... 70
erosum	... 163	filix-fœmina	... 188		
dimidiatum	... 164	crenatum	... 188		
serra	... 164	Wilsonii	... 188		
bissectum	... 164	brunco-viride	... 189		
furcatum	... 165	marginatum	... 189		
præmorsum	... 166				
cuneatum	... 166	<b>BLECHNUM.</b>			
oropouchense	... 166	lanceola	... 141		
auritum	... 167	asplenioides	... 142		
macilentum	... 167	unilaterale	... 142		
parvulum	... 167	occidentale	... 142	<b>DANÆA.</b>	
fragrans	... 168	longifolium	... 143	simplicifolia	... 368
scandicinum	... 168	serrulatum	... 143	trifoliata	... 368
myriophyllum	... 168	striatum	... 144	Leprieurii	... 369
delicatulum	... 168	volubile	... 144	alata	... 369
fœniculaceum	... 168			stenophylla	... 369
adiantioides	... 168	<b>BOTRYCHIUM.</b>		elliptica	... 370
montverdense	... 169	ternatum	... 375	nodosa	... 370
cicutarium	... 169	virginianum	... 376	Moritziانا	... 371
rhizophyllum	... 170	Jenmanii	... 376	nigrescens	... 371
diminutum	... 170	dichronum	... 376	jamaicensis	... 372
				Jenmanii	... 372

## INDEX.—CONTINUED.

	Page.		Page.		Page.
<b>DAVALLIA.</b>		<b>HEMITELIA.</b>		<b>HYPOLEPIS.</b>	
Imrayana	... 66	grandifolia	... 41	repens	... 102
saccoloma	... 67	obtusa	... 42	Purdieana	... 102
Sloaneii	... 67	Imrayana	... 42	inervis	... 102
Parkerii	... 67	horrida	... 42	hostilis	... 102
speluncæ	... 68	Hookerii	... 43	nigrescens	... 103
inequalis	... 69	marginalis	... 43		
aculeata	... 69	sagittifolia	... 43		
fumarioides	... 69	Wilsonii	... 44		
clavata	... 69	sessiliflora	... 44	<b>LINDSAYA.</b>	
		macrocarpa	... 44	reniformis	... 72
		macroSORA	... 45	sagittata	... 72
<b>DICKSONIA.</b>		Sherringii	... 45	macrophylla	... 72
cicutaria	... 62	trinitensis	... 46	falciformis	... 72
apiifolia	... 63	Hartii	... 46	dubia	... 73
dissecta	... 63	Le Prieurii	... 47	crenata	... 73
rubiginosa	... 63	multiflora	... 47	pumila	... 73
anthriscifolia	... 64	Parkerii	... 47	arcuata	... 74
antillensis	... 64	guianensis	... 47	falcata	... 74
coniifolia	... 64	Hostmanii	... 47	Le Prieurii	... 74
Plumierii	... 65	superba	47	sub-rotundifolia	... 74
obtusifolia	... 65			lancea	... 74
				botrychioides	... 75
				mazarunensis	... 75
				caudata	... 75
<b>DIDYMOCHLÆNA.</b>		<b>HYMENOPHYLLUM.</b>		trapeziformis	... 76
lunulata	... 193	tunbridgense	... 5	quadrangularis	... 76
		fucoides	... 5	horizontalis	... 76
<b>ENTEROSORA.</b>		Houstonii	... 6	guianensis	... 76
Campbellii	... 315	abruptum	... 6	montana	... 76
		asplenoides	... 6	imbricata	... 76
<b>FADYENIA.</b>		vincentinum	... 7	venosa	... 77
prolifera	... 249	panicarpum	... 7	portoricensis	... 77
		polyanthos	... 7	stricta	... 77
		sanguinolentum	... 8	aquatica	... 78
		protrusum	... 8	parvula	... 78
<b>GLEICHENIA.</b>		clavatum	... 8	tenuis	... 79
pubescens	... 351	sphærocarpum	... 8	filiformis	... 79
furcata	... 351	nyriocarpum	... 8		
Matthewsii	... 352	dejectum	... 9	<b>LOMARIA.</b>	
longipinnata	... 352	undulatum	... 9	onocleoides	... 136
æqualaterale	... 353	axillare	... 9	attenuata	... 136
Bancroftii	... 353	apicale	... 10	Feei	... 137
dichotoma	... 354	crispum	... 10	L'Herminierii	... 137
pectinata	... 354	amœnum	... 10	Plumierii	... 138
		valvatum	... 10	procera	... 138
		latifrons	... 10	Boryana	... 139
<b>GYMNOGRAMMA.</b>		lanatum	... 11	magellanica	... 139
cyclophylla	... 309	hirsutum	... 11	Schomburghii	... 139
elaphoglossoides	... 309	elegantissimum	... 11	volubile	... 140
pumila	... 309	antillense	... 12		
rufa	... 310	lineare	... 12	<b>LONCHITES.</b>	
gracilis	... 310	trifidum	... 12	aurita	... 112
cousimilis	... 310	sericeum	... 12		
diplazioides	... 311	elegantulum	... 13	<b>LYGODIUM.</b>	
chærophylla	... 311	pulchellum	... 13	hirtum	... 364
Schomburghiana	... 311	ciliatum	... 13	volubile	... 365
hirta	... 312	Boryanum	... 13	venustum	... 365
flexuosa	... 312	goratum	... 14		
schizophylla	... 313	microcarpum	... 14		
trifoliata	... 313	organense	... 14		
tartarea	... 313	hirtellum	... 14		
triangulata	... 314	kaiteurum	... 15		
calomelanos	... 314	Catherinæ	... 15		
sulphurea	... 315				
				<b>MARATTIA.</b>	
				cicutefolia	... 366
<b>HEMIONITIS.</b>		<b>HYPODERRIS.</b>		alata	... 367
palmata	... 316	Brownii	... 61	Kaulfussii	... 367
pinnata	... 317				

## INDEX.—CONTINUED.

	Page.		Page.		Page.
<b>MENISCIUM.</b>		<b>NEPHRODIUM.</b>		<b>PELLEA.</b>	
angustifolium ...	306	propinquum ...	232	geraniæfolia ...	109
macrophyllum ...	306	calcarum ...	232	ternifolia ...	110
Kapplerianum ...	307	usitatum ...	232	flexuosa ...	110
serratum ...	307	venustum ...	233		
reticulatum ...	307	Fendlerii ...	233		
		sub-cuneatum ...	234		
<b>MONOGRAMME.</b>		deflexum ...	234	<b>PLAGIOGYRIA.</b>	
graminoides ...	320	deltoideum ...	235	bi-serrata ...	111
minor ...	320	Grayii ...	235		
seminuda ...	321	brachyodon ...	235		
immersa ...	621	jamaicense ...	236	<b>POLYPODIUM.</b>	
		bermudianum ...	236	furcatum ...	253
<b>NEPHRODIUM.</b>		triste ...	237	Fawcetti ...	253
brachypoda ...	207	tetragonum ...	237	dendricolum ...	254
sanctum ...	208	aurea-viridum ...	238	gramineum ...	254
cariboeum ...	208	serra ...	238	nigro-limbatum ...	254
Nockianum ...	209	Sloanei ...	238	marginellum ...	255
negligens ...	209	connexum ...	239	serrulatum ...	255
rigidulum ...	210	quadaloupense—	239	Jamesonii ...	255
Kaulfussii ...	210	patens ...	240	myosuroides ...	256
oligocarpum ...	210	molle ...	240	Sherringii ...	256
conterminum ...	211	dejectum ...	241	nimbajum ...	257
sitiurum ...	211	pedatum ...	241	exiguum ...	257
umbatum ...	211	Murrayii ...	241	trichomanoides ...	257
Jenmanii ...	211	Purdiei ...	242	basi-attenuatum ...	258
limbatum ...	212	macrophyllum ...	242	truncicola ...	258
Sprenglii ...	212	cicutarium ...	243	tenifolium ...	258
resino-foetidum ...	213	apiifolium ...	244	nutatum ...	259
Sherringii ...	214			Hartii ...	259
crenuleum ...	214	<b>NEPHROLEPIS.</b>		Sendallianum ...	259
Holmei ...	214	pectinata ...	245	moniliforme ...	260
firmum ...	215	sesquipedale ...	246	saxicolium ...	260
trichoforum ...	215	cordifolia ...	246	albo-punctatum ...	260
vellum ...	216	exaltata ...	247	mazarunianum ...	261
Le Prieurii ...	216	bi-serrata ...	248	jubeforme ...	261
sub-fuscum ...	217	tuberosa ...	246	subtile ...	261
stipulare ...	217			kaiteurianum ...	262
thelypteris ...	218	<b>NOTHOCHLÆNA.</b>		Kegelianum ...	262
flix-mas ...	218	trichomanoides ...	104	discolor ...	262
hirtum ...	219	sub-nuda ...	104	nigrescens ...	262
funestum ...	219	pinnatifida ...	104	tovarense ...	263
sub-quinquifidum ...	219	ferruginea ...	104	heterotrichum ...	263
mexicanum ...	220	scariosa ...	105	pendulum ...	264
ascendens ...	220	squamosa ...	105	grenadense ...	264
Grisebachii ...	220	rufa ...	104	sub-sessile ...	265
amplum ...	221			lasiolepis ...	265
villosum ...	222	<b>OLEANDRA.</b>		cultratum ...	265
patulum ...	223	nodosa ...	248	zanthotrichum ...	266
nemorosum ...	223	neriiformis ...	248	capillare ...	267
pubescens ...	223			graveolens ...	267
ocopteroides ...	224	<b>ONYCHIUM.</b>		curvatum ...	267
denticulatum ...	225	strictum ...	113	ottites ...	268
effusum ...	225			trifurcatum ...	268
microstegium ...	226	<b>OPHIOGLOSSUM.</b>		scolopendrioides ...	268
amplissimum ...	226	nudicaule ...	373	comptonifolium ...	268
incisum ...	227	vulgatum ...	374	Eggersii ...	269
scolopendrioides ...	227	reticulatum ...	374	suspensum ...	269
bi-brachiatum ...	228	palmatum ...	374	asplenifolium ...	269
tenebriatum ...	228			brunneo-viride ...	270
asplenioides ...	229	<b>OSMUNDA.</b>		Rookenaamæ ...	270
serrulatum ...	230	regalis ...	356	firmum ...	271
varians ...	231	cinnamomea ...	356	apiculatum ...	272
strigosum ...	231			taxifolium ...	272
unitum ...	231			plumula ...	272
gongylodes ...	232			pectinatum ...	273
				paradisæ ...	274
				simile ...	274













